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(12) **EUROPEAN PATENT SPECIFICATION**

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(54) **Pyridine derivatives, pharmaceutical compositions comprising the same, the use of the same for the manufacture of medicaments having therapeutic or preventative value, and process for preparing the same**

Pyridin-Derivate, deren pharmazeutische Zusammenstellungen, deren Anwendung für die Herstellung von Arzneimitteln mit therapeutischem oder vorbeugendem Wert und Verfahren zu deren Herstellung.

Dérivés de pyridine, compositions pharmaceutiques les contenant, leur utilisation pour la préparation de médicaments de valeur thérapeutique ou préventive et procédé pour leur préparation

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(73) Proprietor: Eisai Co., Ltd.  
Tokyo (JP)

(72) Inventors:  
• Souda, Shigeru  
Ushiku-shi, Ibaraki (JP)  
• Ueda, Norihiro  
Tsukuba-shi Ibaraki (JP)  
• Miyazawa, Shuhei  
Moriyomachi, Kitasouma-gun Ibaraki (JP)  
• Tagami, Katsuya  
Niitari-gun, Ibaraki (JP)  
• Nomoto, Seiichiro  
Ushiku-shi, Ibaraki (JP)  
• Okita, Makoto  
Tsukuba-shi, Ibaraki (JP)

- Shimomura, Naoyuki  
Ushiku-shi, Ibaraki (JP)
- Kaneko, Toshihiko  
Ushiku-shi, Ibaraki (JP)
- Fujimoto, Masatoshi  
Tsukuba-gun, Ibaraki (JP)
- Murakami, Manabu  
Tsukuba-shi, Ibaraki, Japan (JP)
- Oketani, Kiyoshi  
Tsukuba-gun, Ibaraki (JP)
- Fujisaki, Hideaki  
Ryugasaki-shi Ibaraki (JP)
- Shibata, Hisashi  
Tsukuba-shi, Ibaraki (JP)
- Wakabayashi, Tsuneo  
Mito-shi, Ibaraki (JP)

(74) Representative:  
Hansen, Bernd, Dr. Dipl.-Chem. et al  
Hoffmann Eitle,  
Patent- und Rechtsanwälte,  
Arabellastrasse 4  
81925 München (DE)

(56) References cited:  
EP-A- 0 167 943 EP-A- 0 173 664

Remarks:

The file contains technical information submitted  
after the application was filed and not included in  
this specification

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EP 0 654 471 B1

## Description

## TECHNICAL FIELD

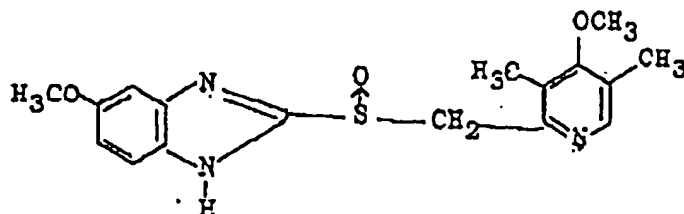
Novel pyridine derivatives exhibiting activity in treating or preventing peptic ulcers, pharmaceutical compositions containing them, and methods of medical treatment are described.

## BACKGROUND ART

Duodenal and gastric ulcers, known collectively as peptic ulcers, are localized erosions of the mucous membrane of the duodenum or stomach, respectively, which expose the underlying layers of the gut wall to the acid secretions of the stomach and to the proteolytic enzyme pepsin. They are believed to be caused by autolysis which is caused by an imbalance between offensive factors, such as acid or pepsin, and defensive factors, such as resistance of the mucous membrane, mucilage secretion, bloodstream or control of the duodenum. Peptic ulceration is the most common disease of the gastro-intestinal tract and it is estimated that approximately 10 to 20% of the adult male population will experience at some time in their lives.

Peptic ulcers are cured or prevented by medical treatment, in principle, and many pharmacotherapies have been suggested, some with high degrees of success.

Clinically useful modalities include H<sub>2</sub>-blockers, such as cimetidine and ranitidine, as anti-ulcer agents. It has been noted, more recently, that inhibitors of H<sup>+</sup>-K<sup>+</sup>-ATPase, an enzyme specifically present in the parietal cells of the stomach, can effectively inhibit the secretion of gastric acid in mammals, including man, therefore it has been expected that a new class of anti-ulcer agents from this viewpoint will come into existence. More specifically, a wide variety of compounds having a benzimidazole structure have been proposed. Among these compounds is Omeprazole, currently under active development, as the most promising compound; see U.S. Patent Nos. 4,337,257; 4,255,431; and 4,508,905. These patents describe compounds with a methoxy group in the 4-position of the pyridine ring. Omeprazole, having the formula:



and further 2-(4-methoxyethoxypyridine-2-yl)-methylsulfinyl-5-methyl-1H-benzimidazole in the working examples thereof.

Related benzyimidazole-type compounds having anti-ulcer activities are described in published application GB 2,134,523A. More specifically, compounds in which the 4-position of the pyridine ring is substituted with an alkoxy-alkoxy group with each alkoxy group containing 1-2 carbons are described. Example 157 of this patent describes 2-(3,5-dimethyl-4-methoxyethoxypyridine-2-yl)methylsulfinyl-5-phenyl-1H-benzimidazole. Other substitutions on various positions of the benzyl and pyridine rings are also described.

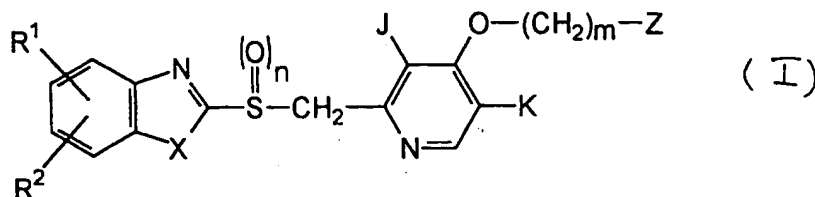
Biological tests reported in tables 4 and 5 of this published application report significant biological effects on gastric acid secretion, both in isolated cells and in laboratory animals, when the 4-position on the pyridine ring is substituted with a methoxy group.

Additional benzimidazole-type compounds, in which the substituent at the 4-position on the pyridine ring is a benzyloxy group, are described in European patent application 0,167,943.

## DISCLOSURE OF THE INVENTION

The present inventors have discovered a class of novel compounds with a more excellent anti-ulcer activity than Omeprazole which is regarded, at the present time, as the most significant benzimidazole-type compound having anti-ulcer activity. As a result of intensive studies, it has been found that compounds represented by formula (I) are more potent in inhibiting gastric acid secretion in comparison with Omeprazole. The present invention has been accomplished on the basis of this finding.

The present invention includes a class of pyridine derivatives represented by the general formula (I):

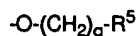


10 wherein  $R^1$  and  $R^2$  may be the same or different from each other and each stand for a hydrogen atom, a  $C_{1-6}$  alkyl,  $C_{1-6}$  alkoxy, halogenated  $C_{1-6}$  alkyl, ( $C_{1-6}$  alkoxy)carbonyl or carboxyl group or a halogen atom; X stands for a group represented by the formula: -O-, -S- or



20 (wherein  $R^3$  stands for a hydrogen atom or a  $C_{1-6}$  alkyl, phenyl, benzyl or ( $C_{1-6}$  alkoxy)carbonyl group);

Z stands for  
a group represented by the general formula:



wherein q stands for an integer of 1 to 3 and  $R^5$  stands for a naphthyl group, which may be substituted with a  $C_{1-6}$  alkoxy group, a hydroxyl group or a halogen atom; a pyridyl group or a furyl group,  
n stands for an integer of 0 to 2; m stands for an integer of 2 to 10; and

30 J and K may be the same or different from each other and each stand for a hydrogen atom or a  $C_{1-6}$  alkyl group, and a pharmaceutically acceptable salt thereof.

The same definitions for  $R^1$ ,  $R^2$ , X, n, J, K, Z and m are used throughout the specification that follows and in the appended claims.

35 Also disclosed are pharmaceutical compositions containing these compounds as the active ingredient(s) and procedures for preventing or treating peptic ulcers in mammals, including humans, using these pharmaceutical compositions.

In the definition of the compounds of general formula (I) given above, the  $C_{1-6}$  alkyl group defined above with respect to  $R^1$ ,  $R^2$ ,  $R^3$ ,  $R^4$ ,  $R^6$ , A,  $R^7$ ,  $R^8$ , J and K in the compound (I) of the present invention may be a straight-chain or branched alkyl groups having 1 to 6 carbon atoms. Examples include methyl, ethyl, n-propyl, n-butyl, isopropyl, isobutyl, 1-methylpropyl, tert-butyl, n-pentyl, 1-ethylpropyl, isoamyl and n-hexyl groups, among which methyl and ethyl groups are most preferred.

40 The  $C_{1-6}$  alkoxy group and the  $C_{1-6}$  alkoxy moiety of the  $C_{1-6}$  alkoxy carbonyl group defined above with respect to  $R^1$  and  $R^2$  may be an alkoxy group derived from the above  $C_{1-6}$  alkyl group. Methoxy and ethoxy groups are most preferred.

45 The halogen atom defined above includes chlorine, bromine, iodine or fluorine.  $R^5$  means naphthyl which may be substituted with a  $C_{1-6}$  alkoxy, hydroxyl group or a halogen atom, or  $R^5$  includes pyridyl and furyl groups.

As for  $R^1$  and  $R^2$ , hydrogens for both and then a combination of a  $C_{1-6}$  alkyl, inter alia methyl, for  $R^1$  and hydrogen for  $R^2$  are preferred. X is preferably -NR<sup>3</sup> where  $R^3$  is hydrogen. A preferred value for n is 1. The preferred substituents for J and K are both hydrogen or where J is  $C_{1-6}$  alkyl, inter alia methyl, and K is hydrogen, or when J is hydrogen K is  $C_{1-6}$  alkyl, inter alia methyl. Thus, J or K are independently preferably hydrogen or methyl, most preferably J is methyl and K is hydrogen.

55 Examples of the pharmaceutically acceptable salt include salts with inorganic acids, such as hydrochloride, hydrobromide, sulfate and phosphate; those with organic acids, such as acetate, malcate, tartrate, methanesulfonate, benzenesulfonate, and toluenesulfonate; and those with amino acids such as arginine, aspartic acid and glutamic acid.

Some of the compounds according to the present invention can form a salt with a metal such as Na, K, Ca or Mg. These metal salts are also included among the pharmaceutically acceptable salts of the present invention. For example, compounds represented by the general formula (I), wherein X is a group of



and R<sup>3</sup> is a hydrogen atom can be present as a metal salt.

Although the compounds of the present invention may also be present as a hydrate or as a stereoisomer, it is a matter of course that these hydrates and stereoisomers are also included in the scope of the present invention.

Now, the effect of the compounds of the present invention will be described by referring to the following pharmacological experiments.

#### Pharmacological Experiment

##### Inhibition against the activity of H<sup>+</sup>-K<sup>+</sup> ATPase

###### (1) Preparation of H<sup>+</sup>-K<sup>+</sup> ATPase

Prepared from the fundic glands of a fresh mucous membrane of a pig stomach according to a modified method of Saccomani et al. (see Biochem. and Biophys. Acta, 464, 313 (1977)).

###### (2) Measurement of the activity of H<sup>+</sup>-K<sup>+</sup> ATPase

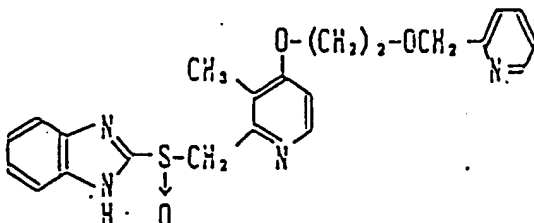
The compound of the present invention was incubated at various concentration in a 40 mM Tris-HCl buffer solution having a pH of 7.40 together with H<sup>+</sup>-K<sup>+</sup> ATPase and 10 µg/ml of a protein at 37°C for 30 minutes, followed by the addition of 15 mM KCl. After 10 minutes, the ATPase reaction was initiated by the addition of 3 mM of MgCl<sub>2</sub> and ATP. After 10 minutes, the amount of the released inorganic phosphoric acid was determined according to the method of Yoda and Hokin (see Biochem. Biophys. Res. Com., 40, 880 (1970)).

The test compound was used as a solution in methanol.

The inhibitory effect was determined by subtracting the amount of the released inorganic acid observed with respect to the case wherein a solution of a test compound was added from that with respect to the control wherein only a solvent was added to determine a difference and dividing this difference by the latter amount and shown by percentage. The inhibitory effect is shown in Table 1 in terms of IC<sub>50</sub>.

(3) The results are shown in Table 1.

Table 1

No.	Compound (Example 2)	IC <sub>50</sub> (M)
1		1.2 × 10 <sup>-6</sup>

It is apparent from the results of the experiments that the compound of the present invention exhibits a high inhibitory effect on the activity of H<sup>+</sup>-K<sup>+</sup> ATPase and is highly safe, so that it can effectively inhibit the secretion of an acid

and is therefore effective in the therapy or prevention of human and animal peptic ulcer.

Further, it should be noted that the compound of the present invention unexpectedly exhibits a faster recovery or resumption of gastric acid secretion than Omeprazole.

At present, this  $H^+-K^+$ ATPase-inhibiting agent is believed to have a more potent inhibitory activity against gastric acid secretion than an  $H_2$ -blocker compound, and thus, in the future, may be the drug of choice for the treatment of ulcers.

But, while more potent inhibitory activity against gastric acid secretion is desirable, too long-lasting inhibition of gastric acid secretion is not preferable for an anti-ulcer agent. For example, it gives rise to the proliferation of Enterochromaffin-like cells (ECL cell) and formation of carcinoid derived from hypergastrinemia; see "Digestion", vol. 35, suppl. 1, page 42 to 55 (1986); the increase in the gastric bacterial flora and endogenous production of N-nitro compounds; see "Brit. Med. J.", vol. 289, page 717 (1984); and difficulty in determining the appropriate dosage regimen.

Thus, an  $H^+-K^+$ ATPase-inhibitory agent which possesses an excellent recovery of gastric acid secretion is most preferred.

The compounds of the present invention are administered for the therapy or prevention of peptic ulcers either orally as powders, granules, capsules or syrup, or parenterally as an injection, or as an external preparation or drop, or as a suppository. Although the dose remarkably varies depending upon symptoms, age or kind of ulcer(s), it may be about 0.01 to 200 mg/kg, preferably 0.05 to 50 mg/kg, still preferably 0.1 to 10 mg/kg a day, and may be administered in a single dose or in divided doses, for example from 2 to 4 times a day.

The drug may be formulated into pharmaceutical presentations using conventional formulation procedures. More specifically, a solid drug for oral application can be prepared by mixing an active principle with filler and, if necessary, binder, disintegrating agent, lubricant, coloring agent, corrigent or the like and converting the obtained mixture into a tablet, coated tablet, granule, powder or capsule.

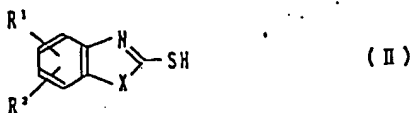
Examples of the filler include lactose, corn starch, sucrose, glucose, sorbitol, crystalline cellulose and silicon dioxide, while those of the binder include polyvinyl alcohol, polyvinyl ether, ethylcellulose, methylcellulose, acacia, tragacanth, gelatin, shellac, hydroxypropylcellulose, hydroxypropylstarch and polyvinylpyrrolidone. Examples of the disintegrating agent include starch, agar, gelatin powder, crystalline cellulose, calcium carbonate, sodium hydrogencarbonate, calcium citrate, dextrin and pectin, while those of the lubricant include magnesium stearate, talc, polyethylene glycol, silica and hardened vegetable oils. The coloring agent may be any one which is permitted to be added to drugs. Examples of the corrigent include cacao powder, mentha herb, aromatic powder, mentha oil, borneol and powdered cinnamon bark. Of course, these tablets and granules may be, if necessary, coated with sugar, gelatin or the like.

The injection can be prepared by mixing an active principle with pH adjusting agent, buffer, stabilizer, solubilizing agent or the like and treating the obtained mixture according to an ordinary process to obtain a subcutaneous, intramuscular or intravenous injection.

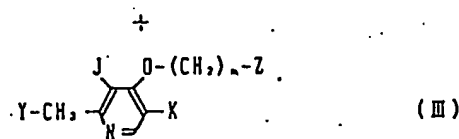
### Preparation process

The compound of the present invention can be prepared by various processes, representative examples of which will now be described.

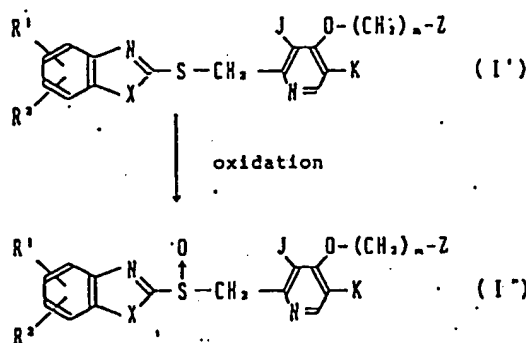
### Preparation process A



wherein  $R^1$ ,  $R^2$  and X are as defined above



wherein m, Z, J and K are as defined above and Y stands for a halogen atom or a sulfonyloxy group



That is, a compound represented by the general formula (II) is reacted with a halide or sulfonate represented by the general formula (III) to obtain a compound represented by the general formula (I') which is an objective compound of the present invention.

Examples of the halogen atom defined with respect to Y include chlorine, bromine and iodine, while those of the sulfonyloxy group include alkylsulfonyloxy groups such as methylsulfonyloxy and ethylsulfonyloxy groups and aromatic sulfonyloxy groups such as benzenesulfonyloxy and tosyloxy groups.

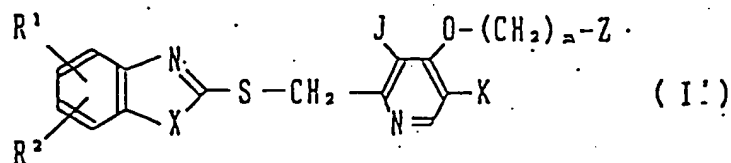
The above reaction is preferably carried out in the presence of an acid scavenger. Examples of the acid scavenger include carbonates and hydrocarbonates of alkali metals, such as potassium carbonate, sodium carbonate and sodium hydrogencarbonate; alkali hydroxides such as sodium hydroxide and potassium hydroxide and organic amines such as pyridine and triethylamine. Examples of the solvent to be used in the reaction include alcohols such as methyl and ethyl alcohols, tetrahydrofuran, dioxane, dimethylformamide, dimethyl sulfoxide and mixtures thereof with water.

The reaction temperature may be from -40°C to the boiling point of the solvent used, preferably from about 0 to 60°C.

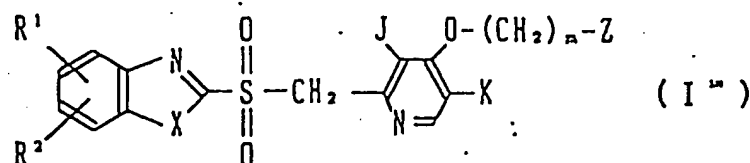
The obtained compound (I') can be easily oxidized into its sulfinyl derivative (I'') which is an objective compound of the present invention corresponding to a compound of the general formula (I) wherein n is 1.

This oxidation can be carried out according to an ordinary process by the use of an oxidizing agent such as hydrogen peroxide, peracetic acid, m-chloroperbenzoic acid, sodium hypochlorite or sodium hypobromite. The solvent to be used in the oxidation is generally selected from among dichloromethane, chloroform, benzene, toluene, methanol, ethanol and the like. The oxidation temperature may be from -70°C to the boiling point of the solvent used, preferable from -60 to 25°C.

Furthermore, a sulfone derivative which is an objective compound of the present invention corresponding to a compound of the formula (I) wherein n is 2 can be prepared by, for example, the following process:



oxidation



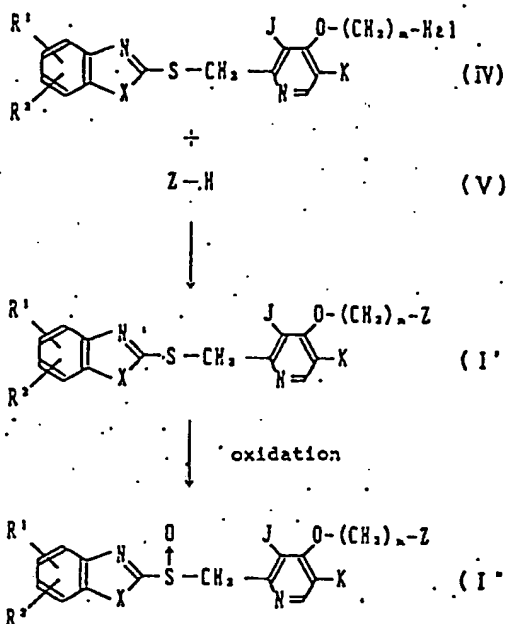
wherein  $\text{R}^1$ ,  $\text{R}^2$ , X, J, m and Z are as defined above.

That is, the thio ether derivative represented by the general formula (I') which is an objective compound of the present invention is oxidized into its sulfone derivative represented by the general formula (I'') which is another objective compound of the present invention.

More precisely, the sulfone derivative (I'') which is an objective compound of the present invention can be prepared by dissolving the compound (I') in a solvent selected from among aromatic hydrocarbons such as benzene, toluene and xylene; halogenated hydrocarbons such as dichloromethane, chloroform and carbon tetrachloride; water; alcohols such as methanol and ethanol; ethyl acetate; acetone; acetic acid and the like to obtain a solution, adding at least twice by equivalent as much oxidizing agent selected from among hydrogen peroxide, peracetic acid, m-chloroperbenzoic acid, sodium hypochlorite, sodium m-periodate and the like to the solution under cooling with ice or at a room temperature and reacting the compound (I') with the oxidizing agent.

Alternatively, the sulfone derivative (I'') can be prepared by dissolving the sulfoxide derivative (I') obtained by the above process in a solvent such as chloroform, adding an oxidizing agent such as m-chloroperbenzoic acid to the obtained solution and reacting the sulfoxide derivative (I') with the oxidizing agent.



Preparation process B

wherein  $R^1$ ,  $R^2$ ,  $X$ ,  $m$ ,  $J$ ,  $K$  and  $Z$  are as defined above and Hal stands for a halogen atom.

That is, an objective compound represented by the general formula (I) can be prepared by reacting a halide represented by the general formula (IV) with an alcohol, thiol or amine represented by the general formula:  $Z-H$  (V). This reaction is preferably carried out in the presence of an acid scavenger. Examples of the acid scavenger include carbonates and hydrogencarbonates of alkali metals, such as potassium carbonate and sodium carbonate; alkali hydroxides such as sodium hydroxide and potassium hydroxide and triethylamine. Examples of the solvent to be used in the reaction include ethers such as tetrahydrofuran and dioxane; ketones such as acetone and methyl ethyl ketone; benzene homologues such as benzene, toluene and xylene; acetonitrile; dimethylformamide; dimethyl sulfoxide and hexamethylphosphoric triamide. The reaction may be carried out either under cooling with ice or at a temperature not exceeding the boiling point of the solvent used.

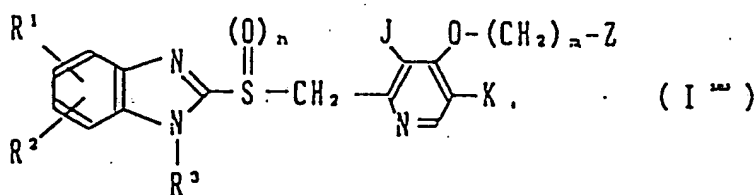
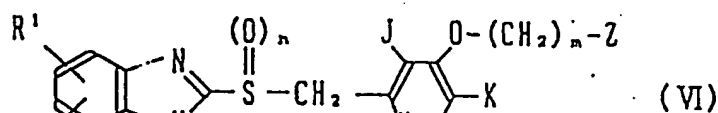
The obtained compound (I') which is an objective compound of the present invention can be oxidized into its sulfinyl derivative represented by the general formula (I'') in a similar manner to that described above in Preparation process A.

Preparation process C

A compound represented by the general formula (I) wherein  $X$  is a group represented by the formula:



(wherein  $R^3$  is a group selected from among those defined above except a hydrogen atom) can be prepared by the following process:



wherein  $\text{R}^1$ ,  $\text{R}^2$ ,  $n$ ,  $\text{J}$ ,  $\text{K}$ ,  $m$  and  $\text{Z}$  are as defined above;  $\text{Hal}$  stands for a halogen atom and  $\text{R}^3$  is a group selected from among those defined with respect to  $\text{R}^3$  of the formula (I) except a hydrogen atom, i.e., a  $\text{C}_{1-6}$  alkyl, phenyl, benzyl or  $\text{C}_{1-6}$  alkoxy carbonyl group.

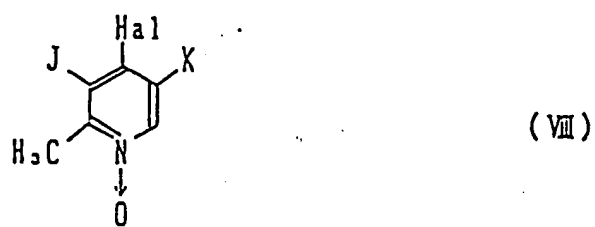
That is, a compound represented by the general formula (I''') which is an objective compound of the present invention can be prepared by condensing a compound represented by the general formula (VI) with a halide represented by the general formula (VII) according to an ordinary process.

This condensation is carried out in the absence of any solvent or in an organic solvent inert to the condensation selected from among benzene, ethanol, xylene, tetrahydrofuran, chloroform, carbon tetrachloride, dimethylformamide and the like either at a room temperature or under cooling with ice or heating for several hours according to an ordinary process. The condensation can be expedited by the use of a dehydrohalogenating agent selected from among inorganic salts such as sodium hydrogencarbonate, potassium carbonate, sodium carbonate and caustic soda or organic bases such as triethylamine, pyridine, pyrimidine and diethylaniline.

Further, the thio ether derivative represented by the general formula (I'''), wherein  $n$  is 0, which has been prepared by condensing a compound represented by the general formula (VI), wherein  $n$  is 0, with a halide (VII) can be easily oxidized into the corresponding sulfoxide ( $n = 1$ ) or sulfone ( $n = 2$ ) derivative according to the same process as that described above.

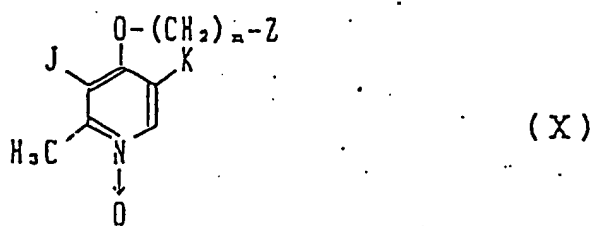
#### Process for the preparation of starting materials

The compound represented by the general formula (III) to be used in the Preparation process A as a starting material can be prepared by, for example, the following process:

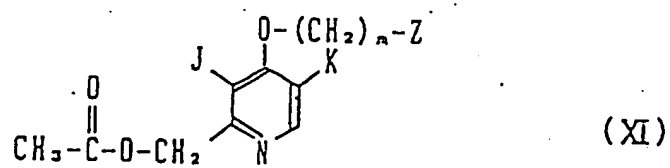


(Step 1)

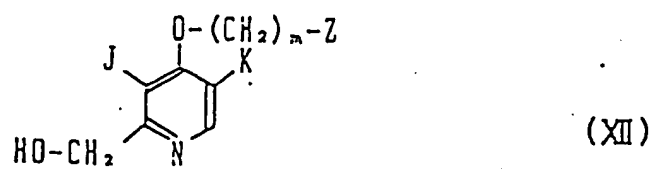
$\text{HO}-(\text{CH}_2)_n-\text{Z}$  (IX)



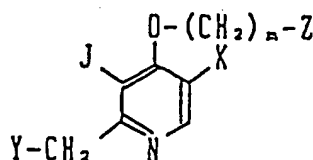
(Step 2)



(Step 3)



(Step 4)



wherein m, Z, J, K and Y are as defined above.

(Step 1)

A 4-halogenopyridine oxide derivative (VII) (for example, 4-chloro-2,3-dimethylpyridine 1-oxide) is reacted with an alcohol derivative represented by the general formula (IX) in the presence of a base to obtain an alkoxy derivative represented by the general formula (X).

Examples of the base include alkali metal hydrides such as sodium hydride and potassium hydride; alkali metals such as metallic sodium; sodium alcoholates such as sodium methoxide and alkali metal hydroxides such as sodium hydroxide and potassium hydroxide. This reaction is carried out either in the absence of any solvent or in a solvent selected from among ethers such as tetrahydrofuran and dioxane; ketones such as acetone and methyl ethyl ketone; benzene homologues such as benzene, toluene and xylene; acetonitrile; dimethylformamide; dimethyl sulfoxide; hexamethylphosphoric triamide and the like at a temperature of from one under cooling with ice to the boiling point of the solvent used.

(Step 2)

The alkoxy derivative of the general formula (X) prepared in the Step 1 is heated in acetic anhydride to a temperature of about 60 to 100°C to obtain an acetoxymethylpyridine derivative represented by the general formula (XI).

(Step 3)

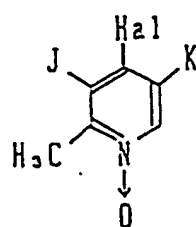
The acetoxymethylpyridine derivative (XI) prepared in the Step 2 is hydrolyzed into the corresponding 2-hydroxymethylpyridine derivative represented by the general formula (XII).

This hydrolysis is generally carried out under alkaline conditions.

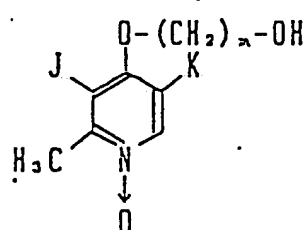
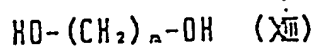
(Step 4)

The 2-hydroxymethylpyridine derivative (XII) prepared in the Step 3 is halogenated with, for example, a chlorinating agent such as thionyl chloride into a 2-halogenomethylpyridine derivative represented by the general formula (III). In this halogenation, for example, chloroform or dichloromethane is used as a solvent. Further, the 2-hydroxymethylpyridine derivative (XII) is reacted with an active sulfonyl chloride such as methanesulfonyl chloride to obtain a sulfonyloxy derivative represented by the general formula (III). In this reaction, for example, chloroform, dichloromethane, ether, tetrahydrofuran, pyridine or benzene is used as a solvent.

Alternatively, the compound represented by the general formula (X) to be used in the above process can be prepared by the following process:

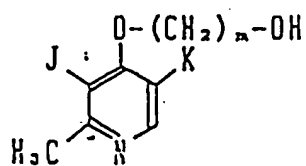


(Step 1)



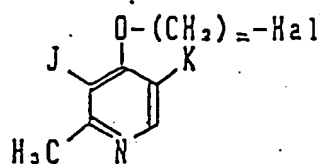
(Step 2)





(XV)

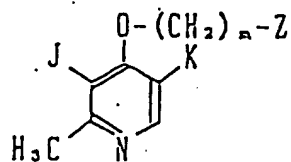
(Step 3)



(XVI)

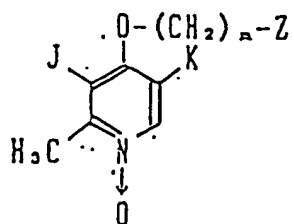
(Step 4)

H-Z (V)



(XVII)

(Step 5)



(X)

(Step 1)

A compound represented by the general formula (VIII), wherein Hal stands for a halogen atom such as chlorine atom, is condensed with a compound represented by the general formula (XIII) according to an ordinary process to

obtain a compound represented by the general formula (XIV).

This condensation is preferably carried out in the presence of a base selected from among alkali metal hydrides such as sodium hydride and potassium hydride; alkali metals such as metallic sodium; alkali metal hydroxides such as sodium hydroxide and potassium hydroxide and the like.

The condensation is carried out either in the absence of any solvent or in a solvent selected from among ethers such as tetrahydrofuran and dioxane; ketones such as acetone and methyl ethyl ketone; benzene homologues such as benzene, toluene and xylene; acetonitrile; dimethylformamide; dimethyl sulfoxide; hexamethylphosphoric triamide and the like at a temperature suitably selected from the range of one under cooling with ice to the boiling point of the solvent used.

(Step 2)

The obtained alkoxy derivative (XIV) is reduced into the compound (XV). Precisely, the alkoxy derivative (XIV) is hydrogenated in the presence of a 10% palladium/carbon catalyst in an acetic anhydride/acetic acid mixture to obtain the reduction product (XV).

(Step 3)

The obtained compound (XV) is halogenated with, for example, a chlorinating agent such as thionyl chloride to obtain a 2-halogenoethyl derivative represented by the general formula (XVI). In this halogenation, for example, chloroform or dichloromethane is used as a solvent.

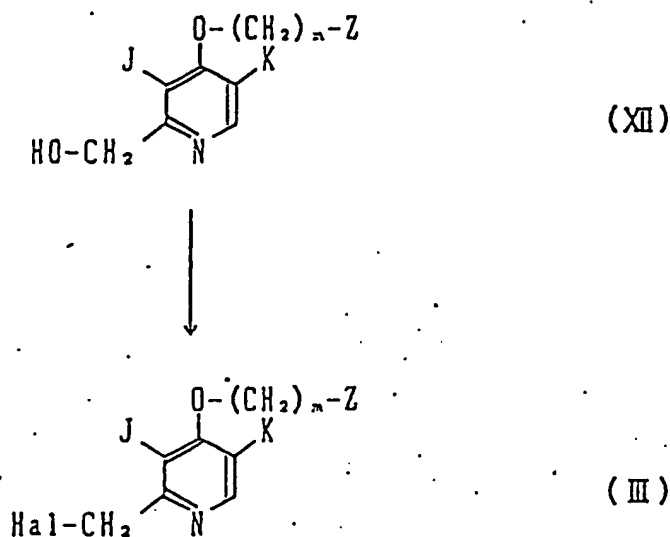
(Step 4)

The obtained compound (XVI) is reacted with an alcohol, thiol or amine represented by the general formula (V) to obtain a compound represented by the general formula (XVII). This reaction is preferably carried out in the presence of an acid scavenger as in the reaction of the Preparation process B.

(Step 5)

The obtained compound (XVII) is oxidized with an oxidizing agent such as hydrogen peroxide, peracetic acid or m-chloroperbenzoic acid to obtain the corresponding N-oxide derivative.

Alternatively, the compound represented by the general formula (III) to be used in the Preparation process A as a starting material can be prepared by the following process:

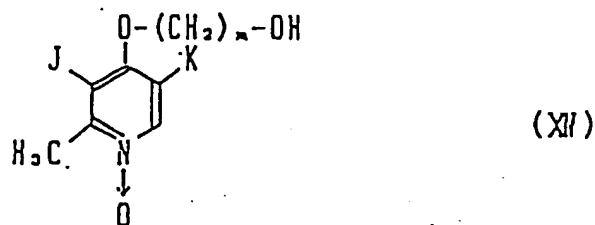


wherein Hal stands for a halogen atom and Z and m areas defined above.

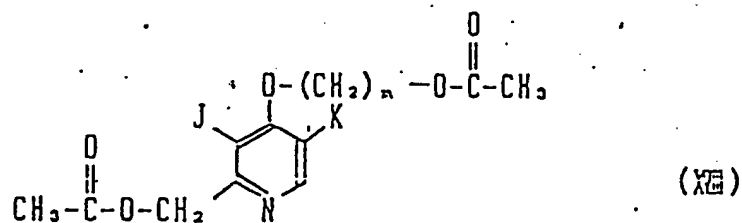
A compound represented by the general formula (XII) is halogenated with, for example, a chlorinating agent such

as thionyl chloride at a temperature of 0°C to a room temperature to obtain a halogenomethylpyridine derivative represented by the general formula (III). In this halogenation, for example, chloroform or dichloromethane is used as a solvent.

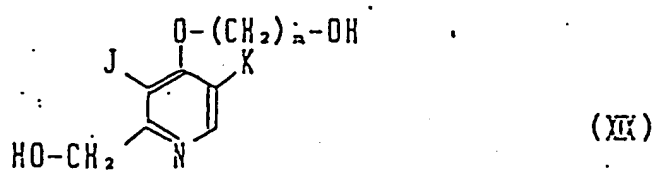
The compound (IV) to be used in the Preparation process B as a starting material can be prepared by, for example, the following process:



(Step 1)



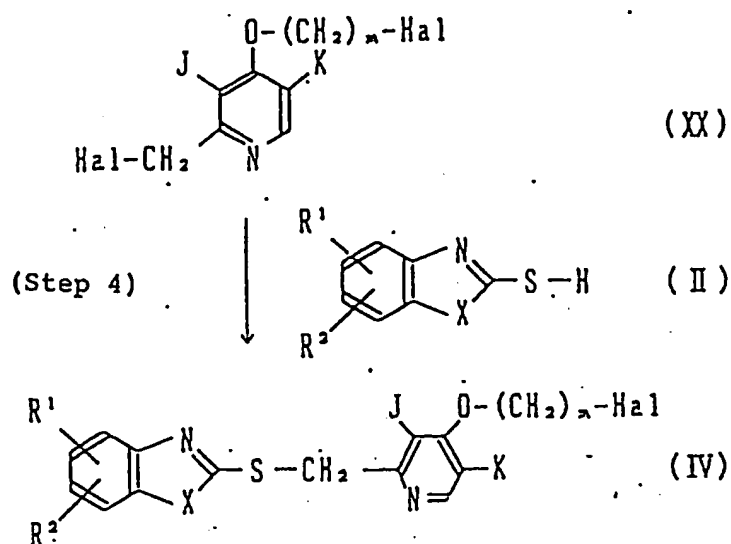
(Step 2)



(Step 3)







wherein Hal stands for a halogen atom and the others are as defined above.

(Step 1)

A compound represented by the general formula (XIV) is converted into the corresponding acetylate (XVIII) according to an ordinary process. For example, acetic anhydride or acetyl chloride is used in this reaction.

(Step 2)

The obtained acetylate is hydrolyzed in the presence of an acid or a base to obtain the corresponding diol derivative (XIX).

(Step 3)

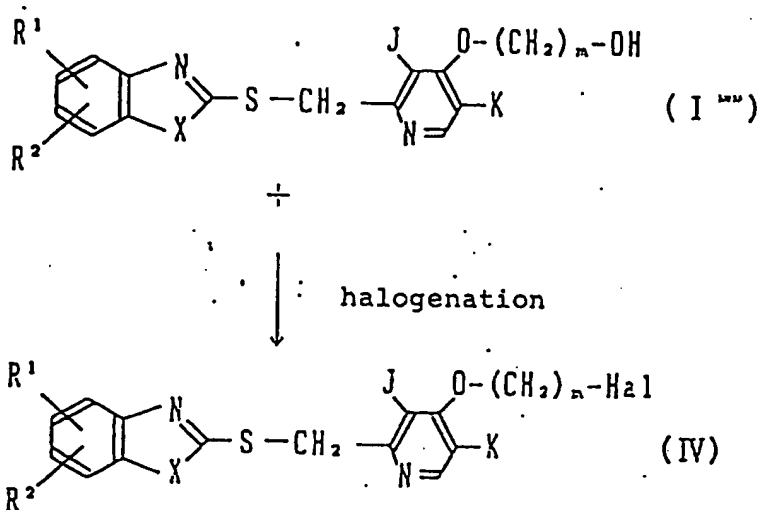
The diol derivative (XIX) is halogenated with, for example, a chlorinating agent such as thionyl chloride to obtain a dihalide represented by the general formula (XX). In this halogenation, for example, chloroform or dichloromethane is used as a solvent.

(Step 4)

The obtained dihalide (XX) is reacted with a compound represented by the general formula (II) to obtain a sulfide derivative represented by the general formula (IV).

This reaction is carried out in the presence of an acid scavenger selected from among carbonates and hydrogen-carbonates of alkali metals, such as potassium carbonate and sodium carbonate, and alkali hydroxides such as sodium hydroxide and potassium hydroxide. Examples of the solvent to be used in the reaction include alcohols such as ethanol and methanol, tetrahydrofuran, dioxane, dimethylformamide, dimethyl sulfoxide and mixtures thereof with water. The reaction temperature may be from 0°C to the boiling point of the solvent used, preferably from about 40 to 60°C.

Alternatively, the compound (IV) to be used in the Preparation process B as a starting material can be prepared by the following process:



wherein Hal stands for a halogen atom and the others are as defined above.

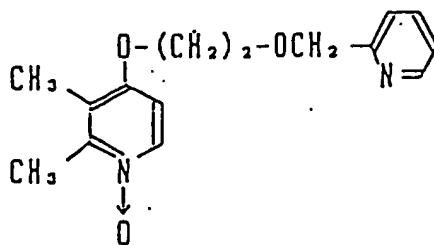
That is, the compound (IV) can be obtained by halogenating the compound (I''') which is an objective compound  
 25 of the present invention and prepared by the Preparation process A according to an ordinary process. More precisely, a compound represented by the general formula (I''') is halogenated with, for example, a chlorinating agent such as thionyl chloride to obtain a halide represented by the general formula (IV). In this halogenation, chloroform or dichloromethane is preferably used as a solvent and the reaction temperature ranges preferably from a room temperature to about 80°C.

30 Examples of the present invention will now be described, though it is needless to say that the present invention is not limited by them at all.

The following Preparative Examples refer to the preparation of raw materials to be used in the preparation of the objective compounds according to the present invention.

#### 35 Preparative Example 1

##### 2,3-Dimethyl-4-(2-pyridylmethoxyethoxy)pyridine N-oxide



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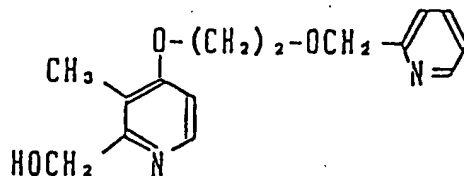
0.39 g of 60% sodium hydride was added to a suspension of 1.20 g (6.5 mmol) of 4-(2-hydroxyethoxy)-2,3-dimethylpyridine N-oxide in 40 ml of tetrahydrofuran under cooling with ice in a nitrogen atmosphere to obtain a mixture. This mixture was stirred for 0.5 hour, followed by the addition of 0.83 g (6.5 mmol) of 2-chloromethylpyridine. The obtained  
 55 mixture was heated under reflux for 8 hours, cooled and filtered. The filtrate was concentrated and purified by silica gel column chromatography (solvent: ethyl acetate/n-hexane = 4 : 1 ~  $\text{CHCl}_3/\text{MeOH}$  = 19 : 1) to obtain 0.61 g of 2,3-dimethyl-4-(2-pyridylmethoxyethoxy)pyridine N-oxide.

<sup>1</sup>H-NMR(CDCl<sub>3</sub>) δ :

2.20(s, 3H), 2.50(s, 3H), 3.80~4.04(m, 2H), 4.04~4.28(m, 2H), 4.70(s, 2H), 6.60(d, H), 7.00~7.74(m, 3H), 8.04(d, H), 8.45(d, H)

## Preparative Example 2

### 2-Hydroxymethyl-3-methyl-4-(2-pyridylmethoxyethoxy)pyridine

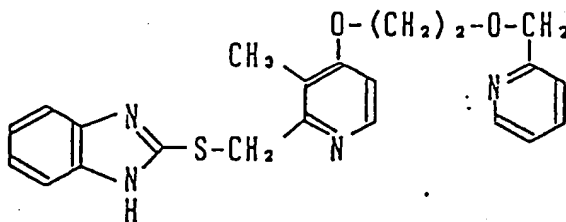


A mixture comprising 0.60 g of 2,3-dimethyl-4-(2-pyridylmethoxyethoxy)pyridine N-oxide and acetic anhydride was stirred at 100°C for 0.5 hour and cooled, followed by the addition of 40 ml of ethanol. The obtained mixture was stirred at a room temperature for 0.5 hour and distilled to remove the solvent. The residue was dried in a vacuum to obtain 0.47 g of crude 2-acetoxymethyl-3-methyl-4-(2-pyridylmethoxyethoxy)pyridine as an oil.

This crude intermediate was dissolved as such in 1N HCl to obtain a solution. This solution was stirred at 100°C for one hour, cooled, neutralized with a saturated aqueous solution of sodium hydrogencarbonate and extracted with 50 ml of dichloromethane twice. The extract was dried over magnesium sulfate and filtered. The filtrate was concentrated and purified by silica gel column chromatography (solvent: ethyl acetate) to obtain 0.40 g of 2-hydroxymethyl-3-methyl-4-(2-pyridylmethoxyethoxy)pyridine as a colorless semicrystal.

## Example 1

### 2-[[3-Methyl-4-(2-pyridylmethoxyethoxy)pyridine-2-yl]methylthio]-1H-benzimidazole



0.71 g (6 mmol) of thionyl chloride was added to a solution of 0.40 g (1.5 mmol) of 2-hydroxymethyl-3-methyl-4-(2-pyridylmethoxyethoxy)pyridine in 10 ml of chloroform under cooling with ice to obtain a mixture. This mixture was stirred at 0°C for 2 hours. After the completion of the reaction, the mixture was neutralized with a saturated aqueous solution of sodium hydrogencarbonate and extracted with 50 ml of chloroform four times. The extract was dried over magnesium sulfate and filtered. The obtained filtrate was concentrated and dried in a vacuum to obtain 0.42 g of crude 2-chloromethyl-3-methyl-4-(2-pyridylmethoxyethoxy)pyridine as a semicrystal.

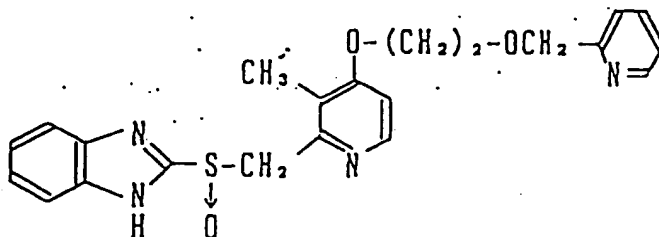
A mixture comprising 0.40 g of this crude intermediate, 0.18 g of 2-mercapto-1H-benzimidazole, 0.19 g of potassium carbonate and 30 ml of methyl ethyl ketone was heated under reflux in a nitrogen atmosphere for 2 hours, cooled and filtered. The filtrate was concentrated and purified by silica gel column chromatography (solvent: ethyl acetate/n-hexane) to obtain 0.38 g of 2-[[3-methyl-4-(2-pyridylmethoxyethoxy)pyridine-2-yl]methylthio]-1H-benzimidazole as a colorless oil.

<sup>1</sup>H-NMR(CDCl<sub>3</sub>) δ :

2.26 (s, 3H), 3.80~4.04(m, 2H), 4.10~4.28 (m, 2H), 4.35(s, 2H), 4.70(s, 2H), 6.70(d, H), 6.94~7.20(m, 7H), 8.25(d,

H), 8.45(d, H)

## Example 2

5 2-[[3-Methyl-4-(2-pyridylmethoxyethoxy)pyridine-2-yl]methylthio]-1H-benzimidazole

20 0.16 g of m-chloroperbenzoic acid was added to a solution of 0.38 g of 2-[[3-methyl-4-(2-pyridylmethoxyethoxy)pyridine-2-yl]methylthio]-1H-benzimidazole in 20 ml of dichloromethane at -60°C in a nitrogen atmosphere to obtain a mixture. This mixture was stirred for 0.5 hour. After the completion of the reaction, 0.16 g of triethylamine was added to the reaction mixture. The obtained mixture was heated to -10°C, followed by the addition of 30 ml of a saturated aqueous solution of sodium hydrogencarbonate. The obtained mixture was stirred at a room temperature for 0.5  
 25 hour and extracted with 50 ml of dichloromethane thrice. The extract was dried over magnesium sulfate and filtered. The filtrate was concentrated and dried in a vacuum to obtain a crude product. This crude product was crystallized from dichloromethane/diethyl ether to obtain 0.31 g of 2-[[3-methyl-4-(2-pyridylmethoxyethoxy)pyridine-2-yl]methylsulfanyl]-1H-benzimidazole as a white crystal.

30 <sup>1</sup>H-NMR(CDCl<sub>3</sub>) δ ;  
 2.17(s, 3H), 3.83~4.06(m, 2H), 4.06~4.34 (m, 2H), 4.72(s, 2H), 4.64~4.84(m, 2H), 6.70(d, H), 7.04~7.80(m, 7H),  
 8.27(d, H), 8.55(d, H)

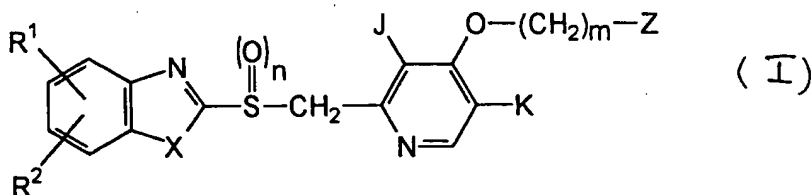
## Claims

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Claims for the following Contracting States : AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE

1. A pyridine derivative represented by the general formula (I):

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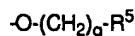
50 wherein R<sup>1</sup> and R<sup>2</sup> may be the same or different from each other and each stand for a hydrogen atom, a C<sub>1-6</sub> alkyl, C<sub>1-6</sub> alkoxy, halogenated C<sub>1-6</sub> alkyl, (C<sub>1-6</sub> alkoxy)carbonyl or carboxyl group or a halogen atom;  
 X stands for a group represented by the formula: -O-, -S- or

55



(wherein  $R^3$  stands for a hydrogen atom or a  $C_{1-6}$  alkyl, phenyl, benzyl or ( $C_{1-6}$  alkoxy)carbonyl group);

Z stands for  
a group represented by the general formula:

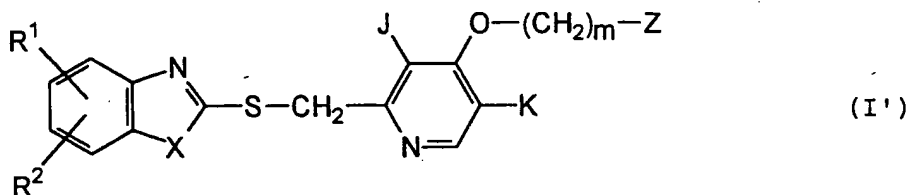


wherein q stands for an integer of 1 to 3 and  $R^5$  stands for a naphthyl group, which may be substituted with a  $C_{1-6}$  alkoxy group, a hydroxyl group or a halogen atom; a pyridyl group or a furyl group,

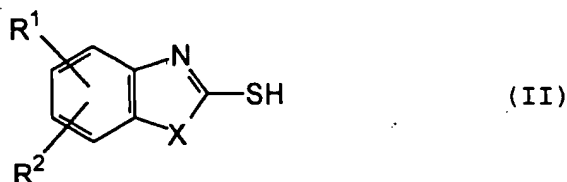
n stands for an integer of 0 to 2; m stands for an integer of 2 to 10; and

J and K may be the same or different from each other and each stand for a hydrogen atom or a  $C_{1-6}$  alkyl group, and a pharmaceutically acceptable salt thereof.

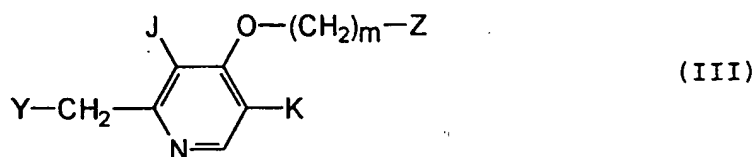
2. A compound according to claim 1, wherein  $R^5$  represents a pyridyl group or a furyl group.
3. A compound according to claim 2, wherein  $R^5$  represents a pyridyl group.
4. A pharmaceutical composition which comprises a pharmacologically effective amount of a pyridine derivative according to any of the claims 1 to 3 or a pharmacologically acceptable salt thereof and a pharmacologically acceptable carrier.
5. A pharmaceutical composition according to claim 4 which comprises 0.1 to 100 g of the pyridine derivative or a pharmacologically acceptable salt thereof per unit dose.
6. A pharmaceutical composition according to claim 4 or 5 for the treatment or prevention of peptic ulcers.
7. The use of a pyridine derivative according to any of the claims 1 to 3 for the manufacture of a medicament for the treatment or prevention of peptic ulcers.
8. A process for producing a compound of general formula I':



wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined in claim 1,  
or a pharmaceutically acceptable salt thereof,  
comprising the step of reacting the compound of formula II with the compound of formula III



wherein  $R^1$ ,  $R^2$  and X are as defined above



10 wherein m, Z, J and K are as defined above and Y represents a halogen atom or a sulfonyloxy group, and optionally converting the product into a salt.

9. A process according to claim 8, wherein Y represents chlorine, bromine or iodine.

15 10. A process according to claim 8, wherein Y represents an alkyl sulfonyloxy group.

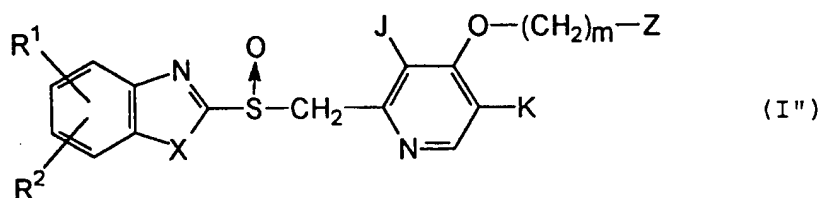
11. A process according to claim 10, wherein the alkyl sulfonyloxy group is a methyl sulfonyloxy group or an ethyl sulfonyloxy group.

20 12. A process according to claim 10, wherein the sulfonyloxy group is an aromatic sulfonyloxy group.

13. A process according to claim 12, wherein the aromatic sulfonyloxy group is a benzene sulfonyloxy group or a tosyloxy group.

25 14. A process according to any of claims 8 to 13, wherein the reaction is carried out in the presence of an acid scavenger.

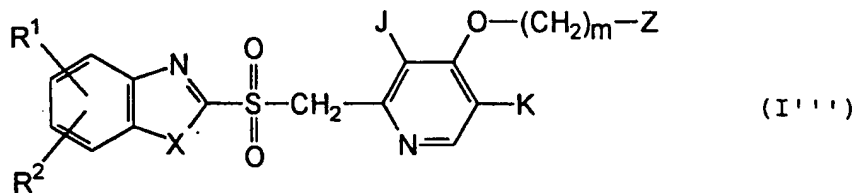
15. A process for producing a compound of formula I'':



40 wherein R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z and m are as defined in claim 1, or a pharmaceutically acceptable salt thereof, comprising the step of reacting the compound of formula I' as defined in claim 8 with an approximately equimolar amount of an oxidizing agent, and optionally converting the product into a salt.

45 16. A process according to claim 15, wherein the oxidizing agent is selected from hydrogen peroxide, peracetic acid, m-chloroperbenzoic acid, sodium hypochlorite or sodium hypobromite.

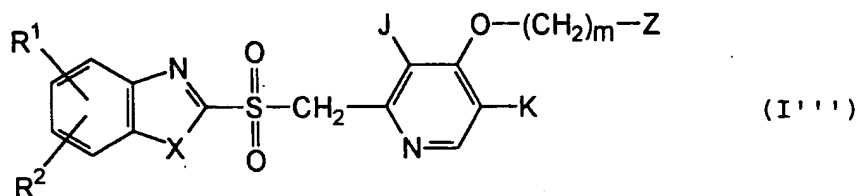
17. A process for producing a compound of formula I'''':



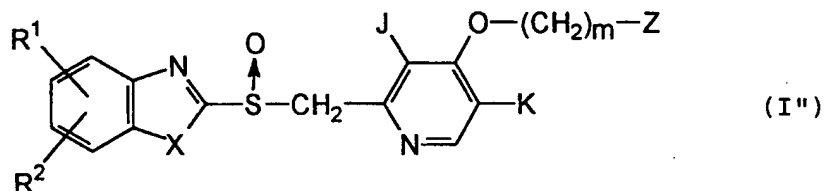
wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined in claim 1,  
or a pharmaceutically acceptable salt thereof,  
comprising the step of reacting the compound of formula I' as defined in claim 8 with at least two molar equivalent  
amounts of an oxidizing agent, and optionally converting the product into a salt.

18. A process according to claim 17, wherein the oxidizing agent is selected from hydrogen peroxide, peracetic acid,  
m-chloroperbenzoic acid, sodium hypochlorite or sodium m-periodate.

19. A process for producing the compound of formula I''':

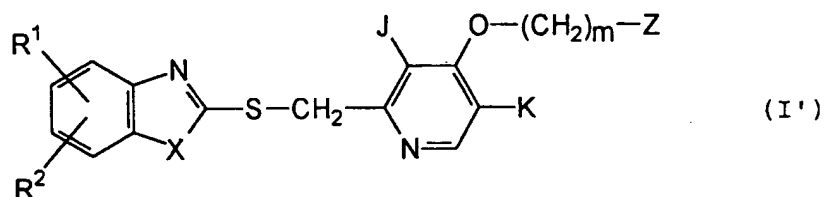


wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined in claim 1,  
or a pharmaceutically acceptable salt thereof,  
comprising the step of reacting an oxidising agent with a compound of formula I'':

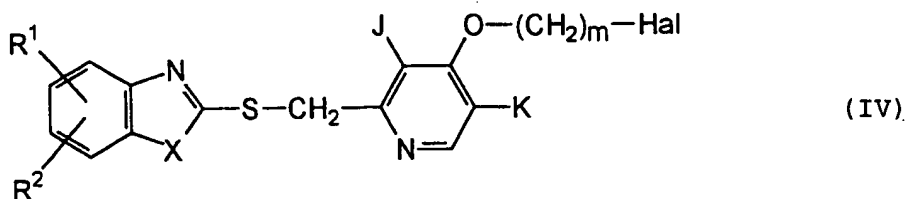


wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined above, and optionally converting the product into a salt.

20. A process for producing a compound of formula I':



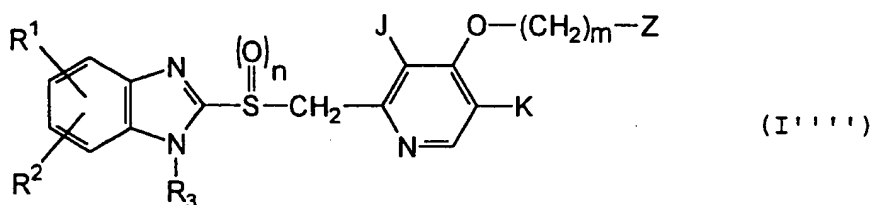
wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined in claim 1, or a pharmaceutically acceptable salt thereof,  
comprising the step of reacting a compound of formula IV:



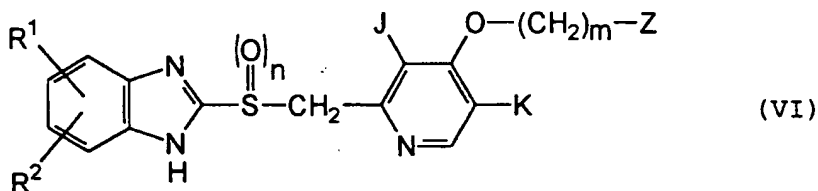
10  
15  
wherein  $R^1$ ,  $R^2$ , X, K, J and m are as defined above and Hal represents a halogen atom, with a compound of formula Z-H, wherein Z is as defined above, and optionally converting the product into a salt.

21. A process according to claim 20, wherein the reaction is carried out in the presence of an acid scavenger.

22. A process for producing a compound of formula I''':



25  
30  
wherein  $R^1$ ,  $R^2$ , n, J, K, m and Z are as defined in claim 1 and  $R^3$  represents a  $C_{1-6}$  alkyl, phenyl, benzyl or ( $C_{1-6}$  alkoxy)carbonyl group, or a pharmaceutically acceptable salt thereof, comprising the step of reacting the compound of formula VI:



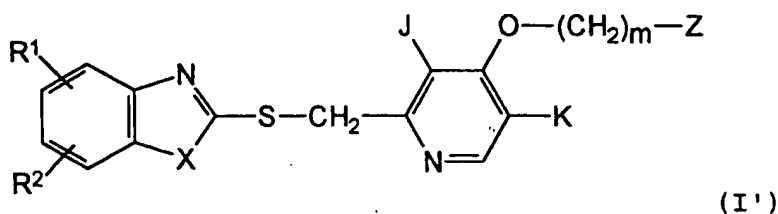
45  
wherein  $R^1$ ,  $R^2$ , n, J, K, m and Z are as defined above, with  $R^3$ Hal, wherein Hal represents a halogen atom, and optionally converting the product into a salt.

23. A process according to claim 22, which is carried out in the presence of a dehydrohalogenating agent.

Claims for the following Contracting States : ES, GR

50  
1. A process for producing a pyridine derivative represented by the general formula I':



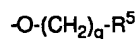


wherein  $R^1$  and  $R^2$  may be the same or different from each other and each stand for a hydrogen atom, a  $C_{1-6}$  alkyl,  $C_{1-6}$  alkoxy, halogenated  $C_{1-6}$  alkyl, ( $C_{1-6}$  alkoxy)carbonyl or carboxyl group or a halogen atom; X stands for a group represented by the formula: -O-, -S- or



(wherein  $R^3$  stands for a hydrogen atom or a  $C_{1-6}$  alkyl, phenyl, benzyl or ( $C_{1-6}$  alkoxy)carbonyl group);

Z stands for  
a group represented by the general formula:



wherein q stands for an integer of 1 to 3 and  $R^5$  stands for a naphthyl group, which may be substituted with a  $C_{1-6}$  alkoxy group, a hydroxyl group or a halogen atom; a pyridyl group or a furyl group,

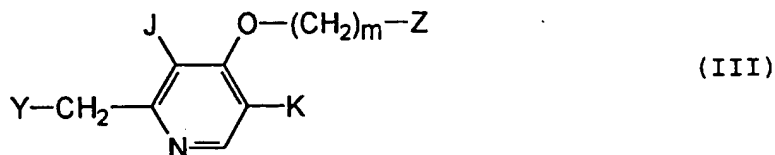
m stands for an integer of 2 to 10; and

J and K may be the same or different from each other and each stand for a hydrogen atom or a  $C_{1-6}$  alkyl group, and a pharmaceutically acceptable salt thereof,

comprising the step of reacting the compound of formula II with the compound of formula III



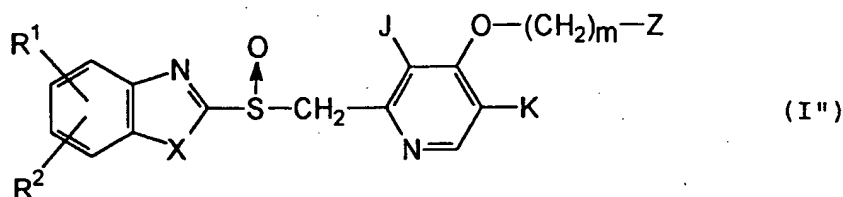
wherein  $R^1$ ,  $R^2$  and X are as defined above



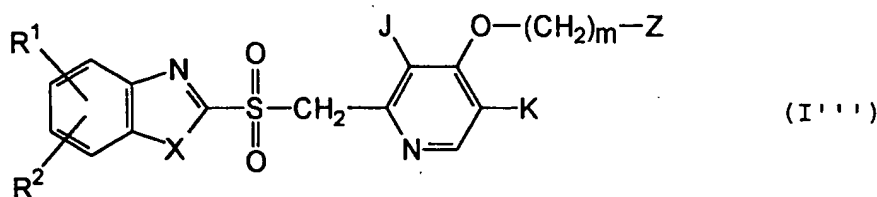
wherein m, Z, J and K are as defined above and Y represents a halogen atom or a sulfonyloxy group,

and optionally converting the product into a salt.

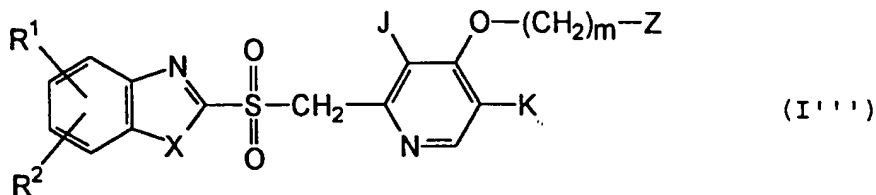
2. A process according to claim 1, wherein Y represents chlorine, bromine or iodine.
- 5 3. A process according to claim 1, wherein Y represents an alkyl sulfonyloxy group.
4. A process according to claim 3, wherein the alkyl sulfonyloxy group is a methyl sulfonyloxy group or an ethyl sulfonyloxy group.
- 10 5. A process according to claim 3, wherein the sulfonyloxy group is an aromatic sulfonyloxy group.
6. A process according to claim 5, wherein the aromatic sulfonyloxy group is a benzene sulfonyloxy group or a tosyloxy group.
- 15 7. A process according to any of claims 1 to 6, wherein the reaction is carried out in the presence of an acid scavenger.
8. A process for producing a compound of formula I'':



- 30 wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined in claim 1,  
or a pharmaceutically acceptable salt thereof,  
comprising the step of reacting the compound of formula I' as defined in claim 1 with an approximately equimolar  
amount of an oxidizing agent, and optionally converting the product into a salt.
- 35 9. A process according to claim 8, wherein the oxidizing agent is selected from hydrogen peroxide, peracetic acid, m-chloroperbenzoic acid, sodium hypochlorite or sodium hypobromite.
  10. A process for producing a compound of formula I''':

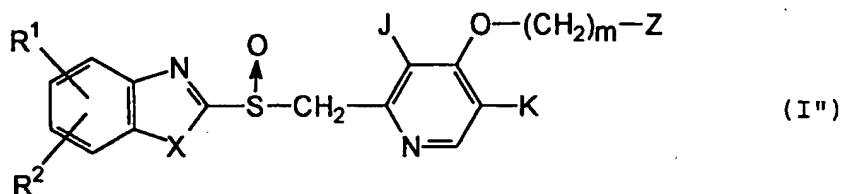


- 50 wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined in claim 1,  
or a pharmaceutically acceptable salt thereof,  
comprising the step of reacting the compound of formula I' as defined in claim 1 with at least two molar equivalent  
amounts of an oxidizing agent, and optionally converting the product into a salt.
- 55 11. A process according to claim 10, wherein the oxidizing agent is selected from hydrogen peroxide, peracetic acid, m-chloroperbenzoic acid, sodium hypochlorite or sodium m-periodate.
  12. A process for producing the compound of formula I''':



10

wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined in claim 1,  
or a pharmaceutically acceptable salt thereof,  
comprising the step of reacting an oxidizing agent with a compound of formula I'':

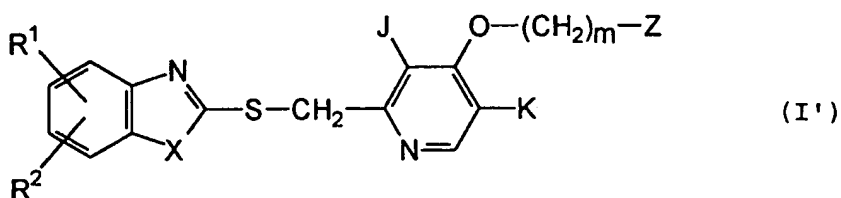


20

wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined above,  
and optionally converting the product into a salt.

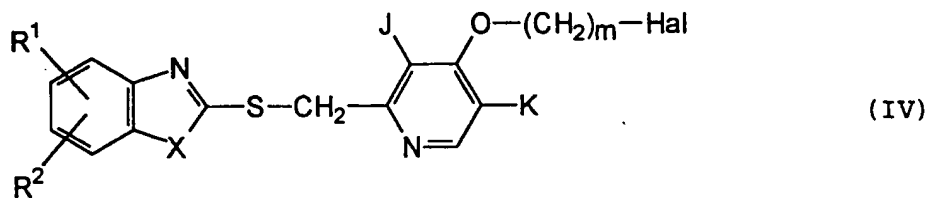
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13. A process for producing a compound of formula I':



35

wherein  $R^1$ ,  $R^2$ , X, J, K, Z and m are as defined in claim 1, or a pharmaceutically acceptable salt thereof,  
comprising the step of reacting a compound of formula IV:



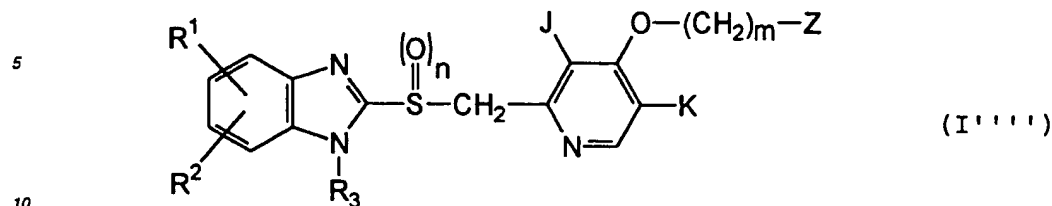
45

wherein  $R^1$ ,  $R^2$ , X, K, J and m are as defined above and Hal represents a halogen atom, with a compound  
of formula Z-H, wherein Z is as defined above,  
and optionally converting the product into a salt.

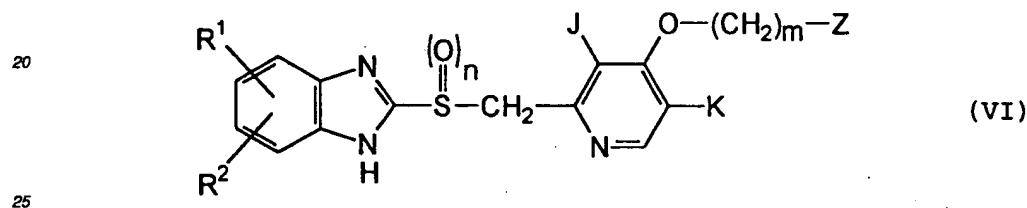
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14. A process according to claim 13, wherein the reaction is carried out in the presence of an acid scavenger.

15. A process for producing a compound of formula I''':



15 wherein  $R^1$ ,  $R^2$ , J, K, m and Z are as defined in claim 1 and  $R^3$  represents a  $C_{1-6}$  alkyl, phenyl, benzyl or  $(C_{1-6}$  alkoxy)carbonyl group, n stands for an integer from 0 to 2, or a pharmaceutically acceptable salt thereof, comprising the step of reacting the compound of formula VI:



30 wherein  $R^1$ ,  $R^2$ , n, J, K, m and Z are as defined above, with  $R^3$ Hal, wherein Hal represents a halogen atom, and optionally converting the product into a salt.

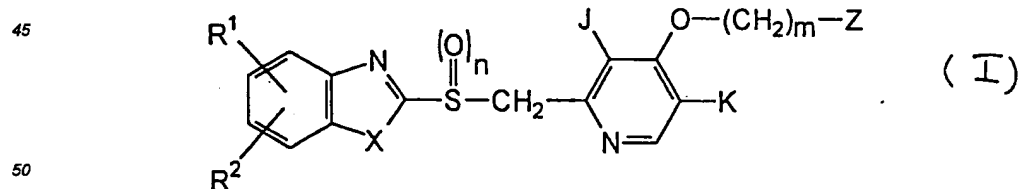
16. A process according to claim 15, which is carried out in the presence of a dehydrohalogenating agent.

35 17. The process of preparing a pharmaceutical composition for the treatment or prevention of peptic ulcers which comprises formulating 0.1 to 100 g of the pyridine derivative or a pharmacologically acceptable salt thereof per unit dose obtained by a process according to any of the foregoing claims together with a pharmacologically acceptable carrier.

#### Patentansprüche

40 Patentansprüche für folgende Vertragsstaaten : AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE

1. Pyridinderivat der allgemeinen Formel I

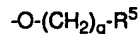


55 worin  $R^1$  und  $R^2$  gleich oder verschieden sein können und ein Wasserstoffatom, ein  $C_{1-6}$ -Alkyl,  $C_{1-6}$ -Alkoxy, halogeniertes  $C_{1-6}$ -Alkyl,  $(C_{1-6}$ -Alkoxy)carbonyl oder Carboxyl oder ein Halogenatom bedeuten; X eine Gruppe bedeutet, dargestellt durch die Formel: -O-, -S- oder



(worin  $R^3$  ein Wasserstoffatom oder  $C_1$ - $C_6$ -Alkyl, Phenyl, Benzyl oder  $(C_1$ - $C_6$ -Alkoxy)carbonyl bedeutet);

Z eine Gruppe der allgemeinen Formel:

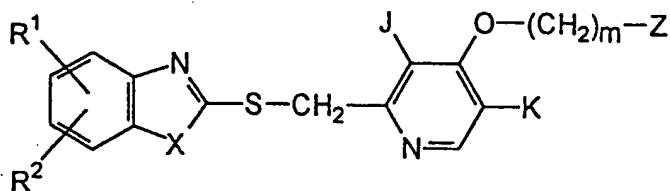


worin q eine ganze Zahl von 1 bis 3 ist, und  $R^5$  eine Naphthylgruppe, die mit einer  $C_1$ - $C_6$ -Alkoxygruppe, eine Hydroxylgruppe oder einem Halogenatom substituiert sein kann; eine Pyridylgruppe oder eine Furylgruppe bedeutet,

n eine ganze Zahl von 0 bis 2 bedeutet; m eine ganze Zahl von 2 bis 10 bedeutet; und

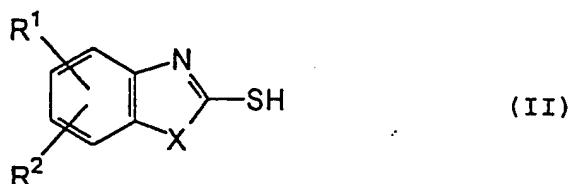
J und K gleich oder verschieden sein können und ein Wasserstoffatom oder eine  $C_1$ - $C_6$ -Alkylgruppe bedeuten, und ein pharmazeutisch annehmbares Salz davon.

2. Verbindung nach Anspruch 1, dadurch gekennzeichnet, daß  $R^5$  eine Pyridylgruppe oder eine Furylgruppe ist.
3. Verbindung nach Anspruch 2, dadurch gekennzeichnet, daß  $R^5$  eine Pyridylgruppe ist.
4. Pharmazeutische Zusammensetzung umfassend eine pharmakologisch wirksame Menge eines Pyridinderivats nach einem der Ansprüche 1 bis 3 oder ein pharmakologisch annehmbares Salz davon und einen pharmakologisch annehmbaren Träger.
5. Pharmazeutische Zusammensetzung nach Anspruch 4, dadurch gekennzeichnet, daß sie pro Dosierungseinheit 0,1 bis 100 g des Pyridinderivats oder eines pharmakologisch annehmbaren Salzes davon umfaßt.
6. Pharmazeutische Zusammensetzung nach Anspruch 4 oder 5 zur Behandlung oder Vorbeugung von Magengeschwüren.
7. Verwendung eines Pyridinderivats nach einem der Ansprüche 1 bis 3 zur Herstellung eines Arzneimittels zur Behandlung oder Vorbeugung von Magengeschwüren.
8. Verfahren zur Herstellung einer Verbindung der allgemeinen Formel I':

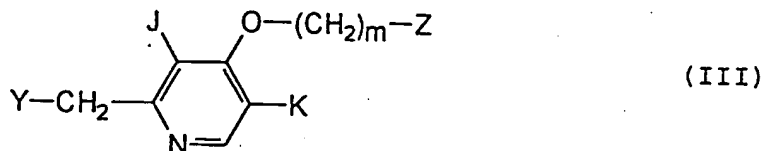


(I')

worin  $R^1$ ,  $R^2$ ,  $X$ ,  $J$ ,  $K$ ,  $Z$  und  $m$  die im Anspruch 1 angegebene Bedeutung besitzen, oder einem pharmazeutisch annehmbaren Salz davon, umfassend die Stufe der Umsetzung der Verbindung der Formel II mit der Verbindung der Formel III

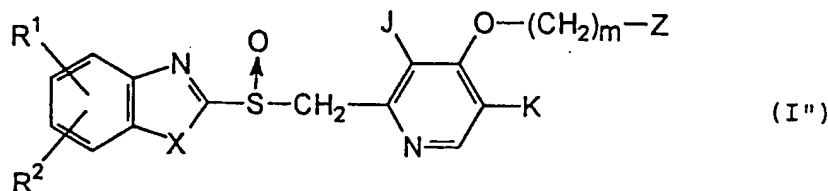


10 worin R<sup>1</sup>, R<sup>2</sup> und X die vorstehend angegebene Bedeutung besitzen,



20 worin m, Z, J und K die vorstehend angegebene Bedeutung besitzen und Y ein Halogenatom oder eine Sulfonyloxygruppe bedeutet, und gegebenenfalls die Überführung des Produkts in ein Salz.

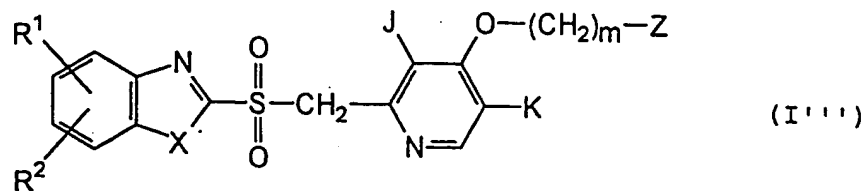
- 25 9. Verfahren nach Anspruch 8, dadurch gekennzeichnet, daß Y Chlor, Brom oder Jod bedeutet.
10. Verfahren nach Anspruch 8, dadurch gekennzeichnet, daß Y eine Alkylsulfonyloxygruppe bedeutet.
11. Verfahren nach Anspruch 10, dadurch gekennzeichnet, daß die Alkylsulfonyloxygruppe eine Methylsulfonyloxygruppe oder eine Ethylsulfonyloxygruppe ist.
- 30 12. Verfahren nach Anspruch 10, dadurch gekennzeichnet, daß die Sulfonyloxygruppe eine aromatische Sulfonyloxygruppe ist.
13. Verfahren nach Anspruch 12, dadurch gekennzeichnet, daß die aromatische Sulfonyloxygruppe eine Benzolsulfonyloxygruppe oder eine Tosyloxygruppe ist.
- 35 14. Verfahren nach einem der Ansprüche 8 bis 13, dadurch gekennzeichnet, daß die Umsetzung in Gegenwart eines Säure-abfangenden Mittels durchgeführt wird.
- 40 15. Verfahren zur Herstellung einer Verbindung der Formel I'':



50 worin R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z und m die in Anspruch 1 angegebene Bedeutung besitzen, oder eines pharmazeutisch annehmbaren Salzes davon, umfassend die Stufe der Umsetzung der Verbindung der Formel I' nach Anspruch 8 mit einer ungefähr äquimolaren Menge eines Oxidationsmittels, und gegebenenfalls die Überführung des Produkts in ein Salz.

- 55 16. Verfahren nach Anspruch 15, dadurch gekennzeichnet, daß das Oxidationsmittel ausgewählt ist aus Wasserstoffperoxid, Peressigsäure, m-Chlorperbenzoesäure, Natriumhypochlorit oder Natriumhypobromit.

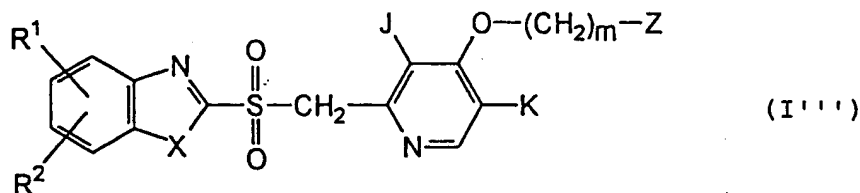
## 17. Verfahren zur Herstellung einer Verbindung der Formel I''':



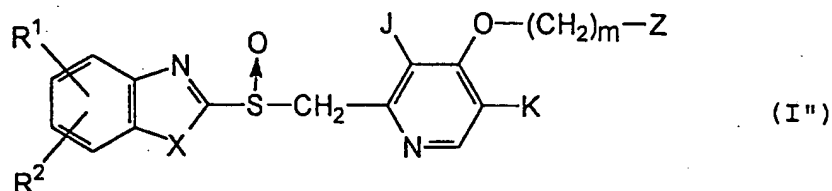
15 worin R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z und m die im Anspruch 1 angegebene Bedeutung besitzen, oder einem pharmazeutisch annehmbaren Salz davon, umfassend die Stufe der Umsetzung der Verbindung der Formel I' nach Anspruch 8 mit mindestens zwei Moläquivalenten eines Oxidationsmittels und gegebenenfalls die Überführung des Produkts in ein Salz.

## 18. Verfahren nach Anspruch 17, dadurch gekennzeichnet, daß das Oxidationsmittel ausgewählt ist aus Wasserstoffperoxid, Peressigsäure, m-Chlorperbenzoesäure, Natriumhypochlorit oder Natrium-m-perjodat.

## 19. Verfahren zur Herstellung einer Verbindung der Formel I''':

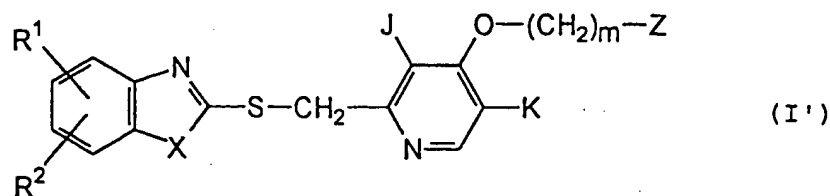


35 worin R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z und m die im Anspruch 1 angegebene Bedeutung besitzen, oder einem pharmazeutisch annehmbaren Salz davon, umfassend die Stufe der Umsetzung eines Oxidationsmittels mit einer Verbindung der Formel I'':



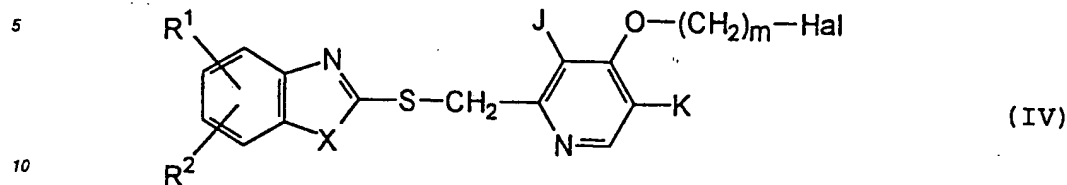
45 worin R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z und m die vorstehend angegebene Bedeutung besitzen, und gegebenenfalls die Überführung des Produkts in ein Salz.

## 20. Verfahren zur Herstellung einer Verbindung der Formel I':



worin R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z und m die in Anspruch 1 angegebene Bedeutung besitzen, oder einem pharmazeutisch

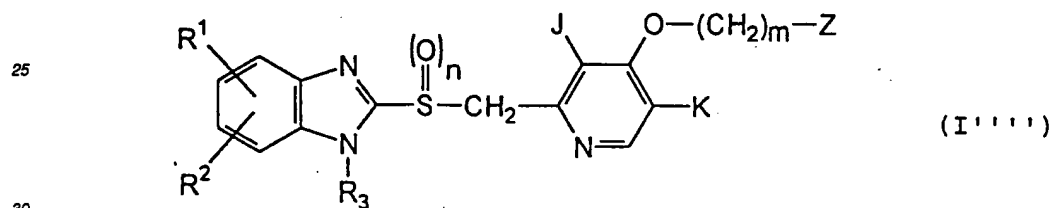
annehmbaren Salz davon,  
umfassend die Stufe der Umsetzung einer Verbindung der Formel IV:



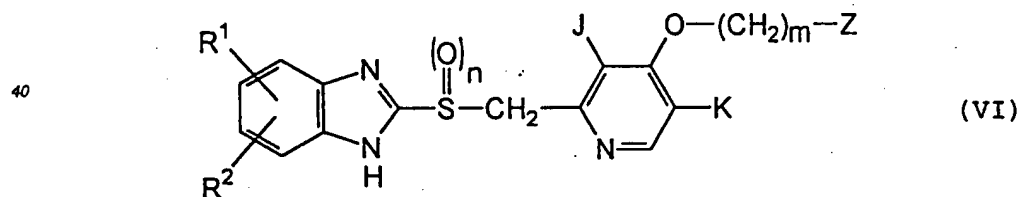
15  
worin R<sup>1</sup>, R<sup>2</sup>, X, K, J und m die vorstehend angegebene Bedeutung besitzen und Hal ein Halogenatom bedeutet, mit einer Verbindung der Formel Z-H, worin Z die vorstehend angegebene Bedeutung besitzt, und gegebenenfalls die Überführung des Produkts in ein Salz.

21. Verfahren nach Anspruch 20, dadurch gekennzeichnet, daß die Umsetzung in Gegenwart eines Säure-abfangenden Mittels durchgeführt wird.

22. Verfahren zur Herstellung einer Verbindung der Formel I''':



35  
worin R<sup>1</sup>, R<sup>2</sup>, n, J, K, m und Z die im Anspruch 1 angegebene Bedeutung besitzen und R<sup>3</sup> ein C<sub>1</sub>-C<sub>6</sub>-Alkyl, Phenyl, Benzyl oder eine (C<sub>1</sub>-C<sub>6</sub>-Alkoxy)carbonylgruppe bedeutet, oder einem pharmazeutisch annehmbaren Salz davon, umfassend die Stufe der Umsetzung der Verbindung der Formel VI



worin R<sup>1</sup>, R<sup>2</sup>, n, J, K, m und Z die vorstehend angegebene Bedeutung besitzen, mit R<sup>3</sup>Hal, worin Hal ein Halogenatom bedeutet, und gegebenenfalls die Überführung des Produkts in ein Salz.

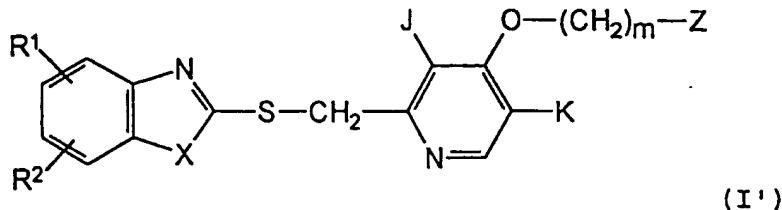
23. Verfahren nach Anspruch 22, dadurch gekennzeichnet, daß es in Gegenwart eines Dehydrohalogenierungsmittels durchgeführt wird.

Patentansprüche für folgende Vertragsstaaten : ES, GR

1. Verfahren zur Herstellung eines Pyridinderivats der allgemeinen Formel I':

55



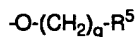


15 worin R<sup>1</sup> und R<sup>2</sup> gleich oder verschieden sein können und ein Wasserstoffatom, C<sub>1</sub>-C<sub>6</sub>-Alkyl, C<sub>1</sub>-C<sub>6</sub>-Alkoxy, halogeniertes C<sub>1</sub>-C<sub>6</sub>-Alkyl, (C<sub>1</sub>-C<sub>6</sub>-Alkoxy)carbonyl- oder Carboxyl oder ein Halogenatom bedeuten; X eine Gruppe bedeutet, dargestellt durch die Formel: -O-, -S- oder



(worin R<sup>3</sup> ein Wasserstoffatom oder C<sub>1</sub>-C<sub>6</sub>-Alkyl, Phenyl, Benzyl oder (C<sub>1</sub>-C<sub>6</sub>-Alkoxy)carbonyl bedeutet;

25 Z eine Gruppe der allgemeinen Formel:



worin q eine ganze Zahl von 1 bis 3 ist, und R<sup>5</sup> eine Naphthylgruppe, die mit einer C<sub>1</sub>-C<sub>6</sub>-Alkoxygruppe, einer Hydroxylgruppe oder einem Halogenatom substituiert sein kann; eine Pyridylgruppe oder eine Furylgruppe bedeutet,

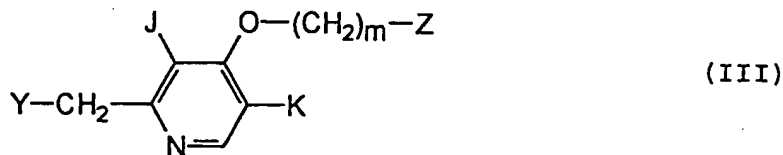
n eine ganze Zahl von 0 bis 2 ist; m eine ganze Zahl von 2 bis 10 bedeutet; und

J und K gleich oder verschieden sein können und ein Wasserstoffatom oder eine C<sub>1</sub>-C<sub>6</sub>-Alkylgruppe bedeuten, und ein pharmazeutisch annehmbares Salz davon,

35 umfassend die Stufe der Umsetzung der Verbindung der Formel II mit der Verbindung der Formel III

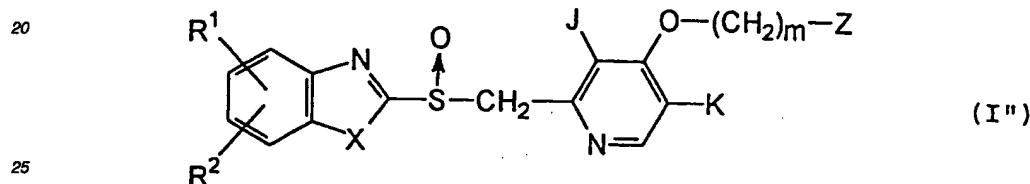


worin R<sup>1</sup>, R<sup>2</sup> und X die vorstehend angegebene Bedeutung besitzen,



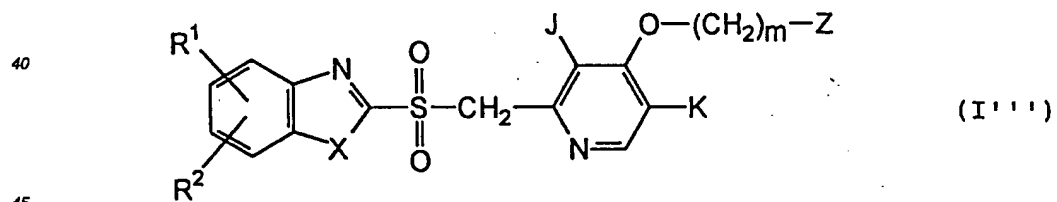
worin m, Z, J und K die vorstehend angegebene Bedeutung besitzen und Y ein Halogenatom oder eine Sulfonylgruppe bedeutet, und gegebenenfalls die Überführung eines Produkts in ein Salz.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß Y Chlor, Brom oder Jod ist.
3. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß Y eine Alkylsulfonyloxygruppe ist.
- 5 4. Verfahren nach Anspruch 3, dadurch gekennzeichnet, daß die Alkylsulfonyloxygruppe eine Methylsulfonyloxygruppe oder eine Ethylsulfonyloxygruppe ist.
5. Verfahren nach Anspruch 3, dadurch gekennzeichnet, daß die Sulfonyloxygruppe eine aromatische Sulfonyloxygruppe ist.
- 10 6. Verfahren nach Anspruch 5, dadurch gekennzeichnet, daß die aromatische Sulfonyloxygruppe eine Benzolsulfonyloxygruppe oder eine Tosyloxygruppe ist.
7. Verfahren nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Umsetzung in Gegenwart eines Säure-abfangenden Mittels durchgeführt wird.
- 15 8. Verfahren zur Herstellung einer Verbindung der Formel I'':



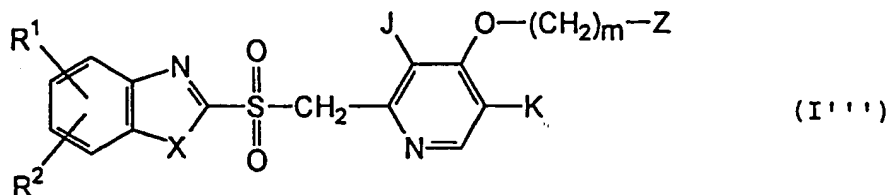
30 worin R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z und m die in Anspruch 1 angegebene Bedeutung besitzen, oder eines pharmazeutisch annehmbaren Salzes davon, umfassend die Stufe der Umsetzung der Verbindung der Formel I' nach Anspruch 1 mit einer ungefähr äquimolaren Menge eines Oxidationsmittels, und gegebenenfalls die Überführung des Produkts in ein Salz.

9. Verfahren nach Anspruch 8, dadurch gekennzeichnet, daß das Oxidationsmittel ausgewählt ist aus Wasserstoffperoxid, Peressigsäure, m-Chlorperbenzoesäure, Natriumhypochlorit oder Natriumhypobromit.
- 35 10. Verfahren zur Herstellung einer Verbindung der Formel I''':

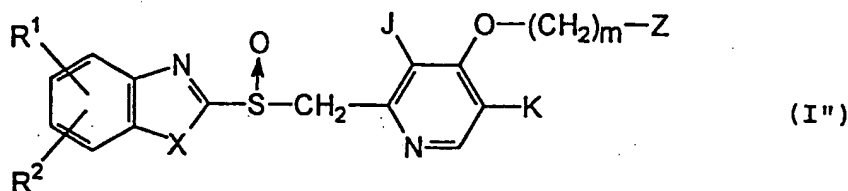


50 worin R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z und m die im Anspruch 1 angegebene Bedeutung besitzen, oder einem pharmazeutisch annehmbaren Salz davon, umfassend die Stufe der Umsetzung der Verbindung der Formel I' nach Anspruch 1 mit mindestens zwei Moläquivalenten eines Oxidationsmittels, und gegebenenfalls die Überführung des Produkts in ein Salz.

11. Verfahren nach Anspruch 10, dadurch gekennzeichnet, daß das Oxidationsmittel ausgewählt ist aus Wasserstoffperoxid, Peressigsäure, m-Chlorperbenzoesäure, Natriumhypochlorit oder Natrium-m-perjodat.
- 55 12. Verfahren zur Herstellung einer Verbindung der Formel I''':

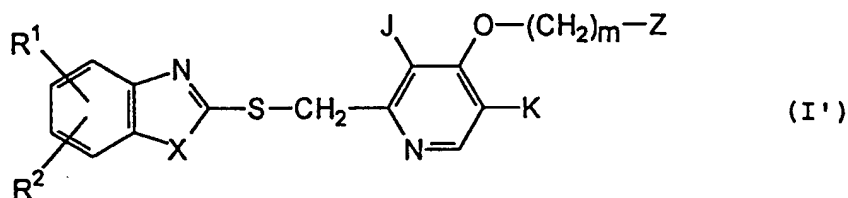


10 worin  $R^1$ ,  $R^2$ , X, J, K, Z und m die im Anspruch 1 angegebene Bedeutung besitzen, oder einem pharmazeutisch annehmbaren Salz davon, umfassend die Stufe der Umsetzung eines Oxidationsmittels mit einer Verbindung der Formel I'':

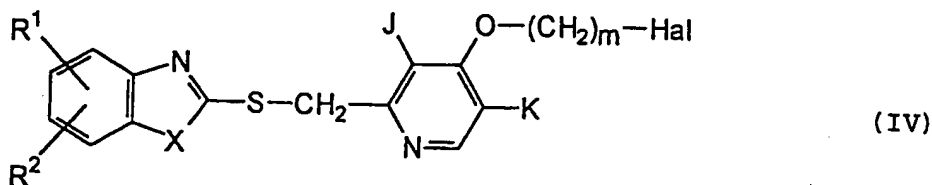


25 worin  $R^1$ ,  $R^2$ , X, J, K, Z und m die vorstehend angegebene Bedeutung besitzen, und gegebenenfalls die Überführung des Produkts in ein Salz.

13. Verfahren zur Herstellung einer Verbindung der Formel I':



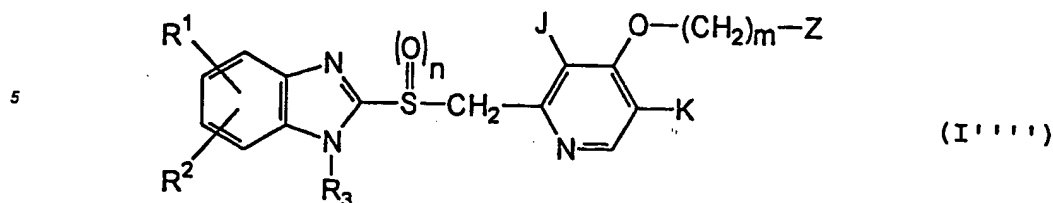
40 worin  $R^1$ ,  $R^2$ , X, J, K, Z und m die in Anspruch 1 angegebene Bedeutung besitzen, oder einem pharmazeutisch annehmbaren Salz davon, umfassend die Stufe der Umsetzung einer Verbindung der Formel IV:



worin  $R^1$ ,  $R^2$ , X, K, J und m die vorstehend angegebene Bedeutung besitzen und Hal ein Halogenatom bedeutet, mit einer Verbindung der Formel Z-H, worin Z die vorstehend angegebene Bedeutung besitzt, und gegebenenfalls die Überführung des Produkts in ein Salz.

55 14. Verfahren nach Anspruch 13, dadurch gekennzeichnet, daß die Umsetzung in Gegenwart eines Säure-abfangenden Mittels durchgeführt wird.

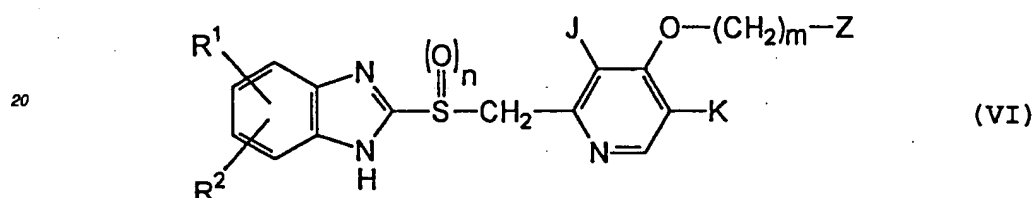
15. Verfahren zur Herstellung einer Verbindung der Formel I''':



10

worin  $R^1$ ,  $R^2$ , J, K, m und Z die im Anspruch 1 angegebene Bedeutung besitzen und  $R^3$   $C_1$ - $C_6$ -Alkyl, Phenyl, Benzyl oder ( $C_1$ - $C_6$ -Alkoxy)carbonyl bedeutet, n eine ganze Zahl von 0 bis 2 ist, oder einem pharmazeutisch annehmbaren Salz davon,

15 umfassend die Stufe der Umsetzung der Verbindung der Formel VI



25

worin  $R^1$ ,  $R^2$ , n, J, K, m und Z die vorstehend angegebene Bedeutung besitzen, mit  $R^3$  Hal, worin Hal ein Halogenatom bedeutet und gegebenenfalls die Überführung des Produkts in ein Salz.

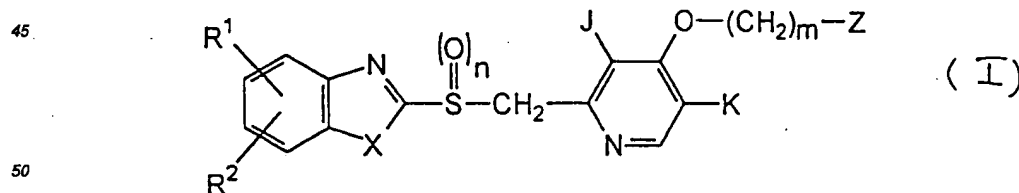
16. Verfahren nach Anspruch 15, dadurch gekennzeichnet, daß es in Gegenwart eines Dehydrohalogenierungsmittels durchgeführt wird.

17. Verfahren zur Herstellung einer pharmazeutischen Zusammensetzung zur Behandlung oder Vorbeugung von Magengeschwüren, dadurch gekennzeichnet, daß man pro Dosierungseinheit 0,1 bis 100 g des Pyridinderivats oder eines pharmakologisch annehmbaren Salzes davon, erhalten nach einem Verfahren gemäß einem der vorhergehenden Ansprüche, zusammen mit einem pharmakologisch annehmbaren Träger zu einer pharmazeutischen Zusammensetzung formuliert.

# Revendications

40 Revendications pour les Etats contractants suivants : AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE

1. Dérivé de pyridine représenté par la formule générale (I) :



dans laquelle  $R^1$  et  $R^2$  peuvent être identiques ou différents l'un de l'autre et chacun représente un atome d'hydrogène, un groupe alkyle en  $C_1$ - $C_6$ , alkoxy en  $C_1$ - $C_6$ , alkyle en  $C_1$ - $C_6$  halogéné, alkoxy(en  $C_1$ - $C_6$ )carbonyle ou carboxyle ou un atome d'halogène;

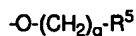
55

X représente un groupe représenté par la formule: -O-, -S- ou



(dans laquelle  $\text{R}^3$  représente un atome d'hydrogène ou un groupe alkyle en  $\text{C}_1\text{-C}_6$ , phényle, benzyle ou alcoxy (en  $\text{C}_1\text{-C}_6$ )carbonyle);

Z représente un groupe représenté par la formule générale:



dans laquelle q représente un nombre entier de 1 à 3 et  $\text{R}^5$  représente un groupe naphthyle, qui peut être substitué avec un groupe alcoxy en  $\text{C}_1\text{-C}_6$ , un groupe hydroxyle ou un atome d'halogène; un groupe pyridyle ou un groupe furyle,

n représente un nombre entier de 0 à 2; m représente un nombre entier de 2 à 10; et

J et K peuvent être identiques ou différents l'un de l'autre et chacun représente un atome d'hydrogène ou un groupe alkyle en  $\text{C}_1\text{-C}_6$ ,

et un sel pharmaceutiquement acceptable de celui-ci.

2. Composé selon la revendication 1, dans lequel  $\text{R}^5$  représente un groupe pyridyle ou un groupe furyle.

3. Composé selon la revendication 2, dans lequel  $\text{R}^5$  représente un groupe pyridyle.

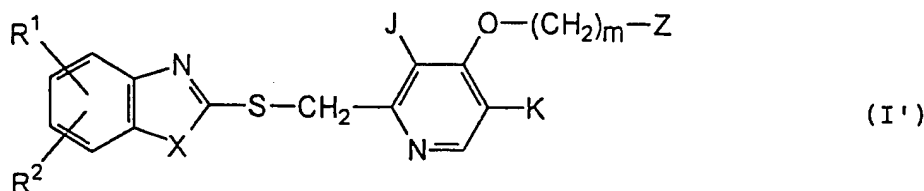
4. Composition pharmaceutique qui comprend une quantité pharmacologiquement efficace d'un dérivé de pyridine selon l'une quelconque des revendications 1 à 3 ou d'un sel pharmacologiquement acceptable de celui-ci et un support pharmacologiquement acceptable.

5. Composition pharmaceutique selon la revendication 4 qui comprend 0,1 à 100 g du dérivé de pyridine ou d'un sel pharmacologiquement acceptable de celui-ci par dose unitaire.

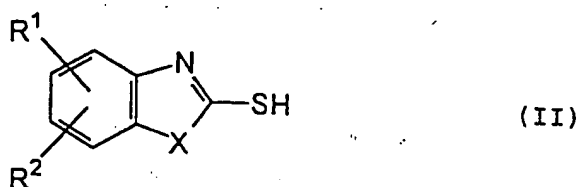
6. Composition pharmaceutique selon la revendication 4 ou 5 pour le traitement ou la prévention des ulcères peptiques.

7. Utilisation d'un dérivé de pyridine selon l'une quelconque des revendications 1 à 3 pour la fabrication d'un médicament pour le traitement ou la prévention des ulcères peptiques.

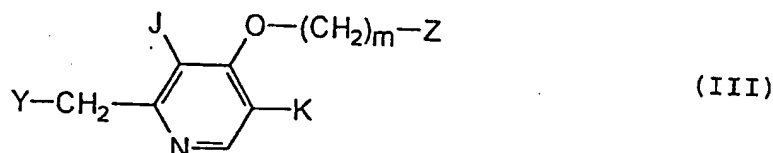
8. Procédé pour la préparation d'un composé de formule générale I':



dans laquelle  $\text{R}^1$ ,  $\text{R}^2$ , X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir le composé de formule II avec le composé de formule III

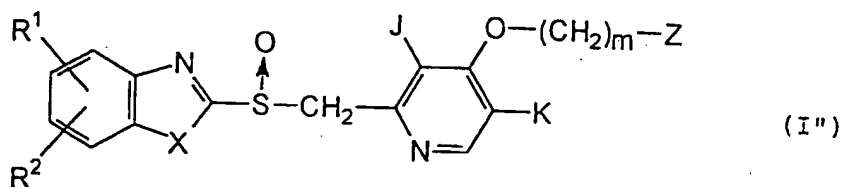


10 où R<sup>1</sup>, R<sup>2</sup> et X sont tels que définis ci-dessus



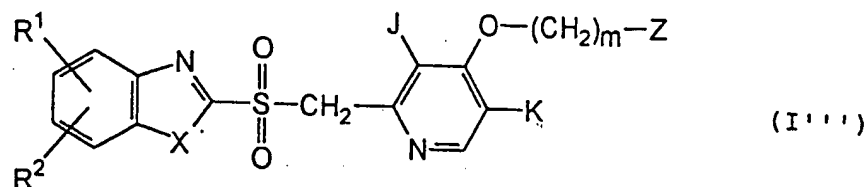
20 où m, Z, J et K sont tels que définis ci-dessus et Y représente un atome d'halogène ou un groupe sulfonyloxy, et éventuellement la transformation du produit en un sel.

- 25 9. Procédé selon la revendication 8, dans lequel Y représente un chlore, un brome ou un iode.
10. Procédé selon la revendication 8, dans lequel Y représente un groupe alkylsulfonyloxy.
11. Procédé selon la revendication 10, dans lequel le groupe alkylsulfonyloxy est un groupe méthylsulfonyloxy ou un groupe éthylsulfonyloxy.
- 30 12. Procédé selon la revendication 10, dans lequel le groupe sulfonyloxy est un groupe sulfonyloxy aromatique.
13. Procédé selon la revendication 12, dans lequel le groupe sulfonyloxy aromatique est un benzènesulfonyloxy ou un groupe tosyloxy.
- 35 14. Procédé selon l'une quelconque des revendications 8 à 13, dans lequel la réaction est effectuée en présence d'un agent de neutralisation d'acide.
15. Procédé pour la préparation d'un composé de formule I'':



50 dans laquelle R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir le composé de formule I' tel que défini dans la revendication 8 avec une quantité approximativement équimolaire d'un agent oxydant, et éventuellement la transformation du produit en un sel.

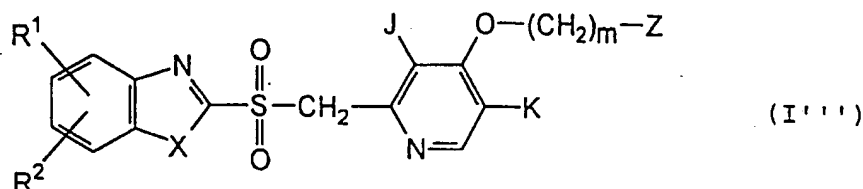
- 55 16. Procédé selon la revendication 15, dans lequel l'agent oxydant est choisi parmi le peroxyde d'hydrogène, l'acide peracétique, l'acide m-chloroperoxybenzoïque, l'hypochlorite de sodium ou l'hypobromite de sodium.
17. Procédé pour la préparation d'un composé de formule I''' :



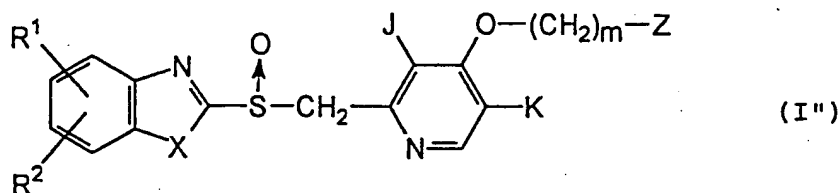
10 dans laquelle  $R^1$ ,  $R^2$ , X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir le composé de formule I' tel que défini dans la revendication 8 avec au moins deux équivalents molaires d'un agent oxydant, et éventuellement la transformation du produit en un sel.

15 18. Procédé selon la revendication 17, dans laquelle l'agent oxydant est choisi parmi le peroxyde d'hydrogène, l'acide peracétique, l'acide m-chloroperoxybenzoïque, l'hypochlorite de sodium ou le m-periodate de sodium.

20 19. Procédé pour la préparation du composé de formule I''':

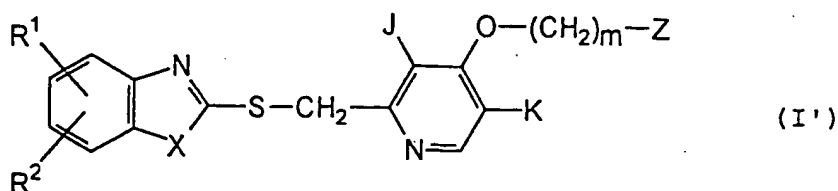


30 dans laquelle  $R^1$ ,  $R^2$ , X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir un agent oxydant avec un composé de formule I'':



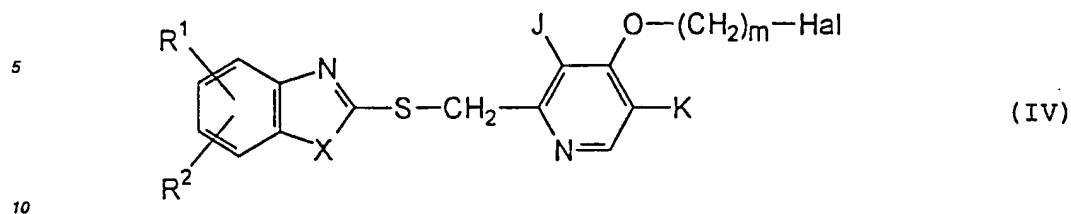
45 dans laquelle  $R^1$ ,  $R^2$ , X, J, K, Z et m sont tels que définis ci-dessus, et éventuellement la transformation du produit en un sel.

20. Procédé pour la préparation d'un composé de formule I':



dans laquelle  $R^1$ ,  $R^2$ , X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci,

comprenant l'étape consistant à faire réagir un composé de formule IV:



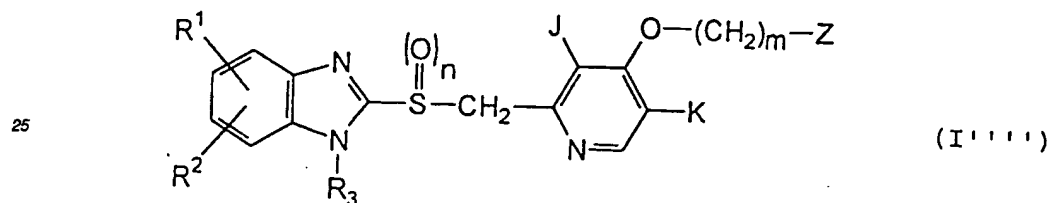
dans laquelle  $R^1$ ,  $R^2$ , X, K, J et m sont tels que définis ci-dessus et Hal représente un atome d'halogène, avec un composé de formule Z-H, dans laquelle Z est tel que défini ci-dessus, et éventuellement la transformation du produit en un sel.

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21. Procédé selon la revendication 20, dans lequel la réaction est effectuée en présence d'un agent de neutralisation d'acide.

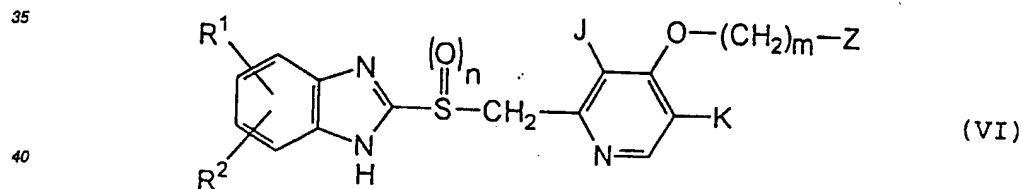
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22. Procédé pour la préparation d'un composé de formule I''':



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dans laquelle  $R^1$ ,  $R^2$ , n, J, K, m et Z sont tels que définis dans la revendication 1 et  $R^3$  représente un groupe alkyle en  $C_1$ - $C_6$ , phényle, benzyle ou alcoxy (en  $C_1$ - $C_6$ ) carbonyle, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir le composé de formule VI:



45

dans laquelle  $R^1$ ,  $R^2$ , n, J, K, m et Z sont tels que définis ci-dessus, avec  $R^3$ -Hal, où Hal représente un atome d'halogène, et éventuellement la transformation du produit en un sel.

23. Procédé selon la revendication 22, qui est effectué en présence d'un agent de déshydrohalogénéation.

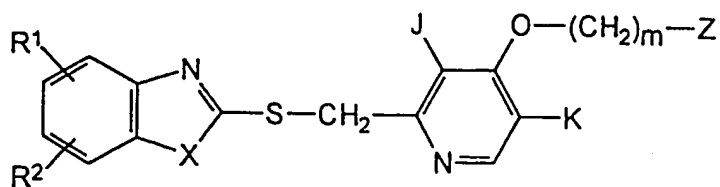
Revendications pour les Etats contractants suivants : ES, GR

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1. Procédé pour la préparation d'un dérivé de pyridine représenté par la formule générale I':

55





(I')

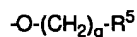
dans laquelle  $R^1$  et  $R^2$  peuvent être identiques ou différents l'un de l'autre et chacun représente un atome d'hydrogène, un groupe alkyle en  $C_1-C_6$ , alcoxy en  $C_1-C_6$ , alkyle en  $C_1-C_6$  halogéné, alcoxy(en  $C_1-C_6$ )carbonyle ou carboxyle ou un atome d'halogène;

X représente un groupe représenté par la formule: -O-, -S- ou



(dans laquelle  $R^3$  représente un atome d'hydrogène ou un groupe alkyle en  $C_1-C_6$ , phényle, benzyle ou alcoxy(en  $C_1-C_6$ )carbonyle);

Z représente un groupe représenté par la formule générale:



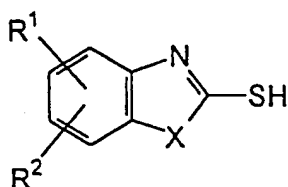
dans laquelle q représente un nombre entier de 1 à 3 et  $R^5$  représente un groupe naphthyle, qui peut être substitué avec un groupe alcoxy en  $C_1-C_6$ , un groupe hydroxyle ou un atome d'halogène; un groupe pyridyle ou un groupe furyle,

m représente un nombre entier de 2 à 10; et

J et K peuvent être identiques ou différents l'un de l'autre et chacun représente un atome d'hydrogène ou un groupe alkyle en  $C_1-C_6$ ,

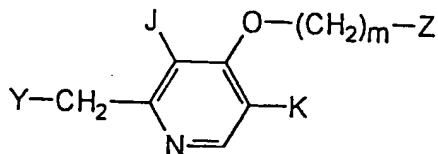
et d'un sel pharmaceutiquement acceptable de celui-ci,

comprenant l'étape consistant à faire réagir le composé de formule II avec le composé de formule III



(II)

où  $R^1$ ,  $R^2$  et X sont tels que définis ci-dessus

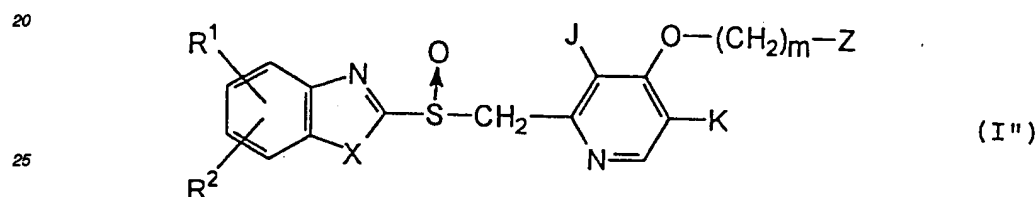


(III)

où m, Z, J et K sont tels que définis ci-dessus et Y représente un atome d'halogène ou un groupe sulfonyloxy, et

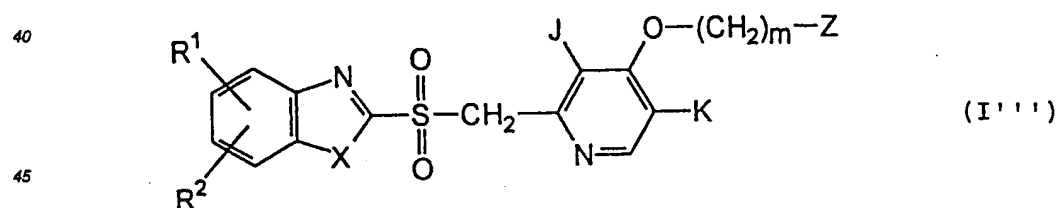
éventuellement la transformation du produit en un sel.

2. Procédé selon la revendication 1, dans lequel Y représente un chlore, un brome ou un iode.
- 5 3. Procédé selon la revendication 1, dans lequel Y représente un groupe alkylsulfonyloxy.
4. Procédé selon la revendication 3, dans lequel le groupe alkylsulfonyloxy est un groupe méthylsulfonyloxy ou un groupe éthylsulfonyloxy.
- 10 5. Procédé selon la revendication 3, dans lequel le groupe sulfonyloxy est un groupe sulfonyloxy aromatique.
6. Procédé selon la revendication 5, dans lequel le groupe sulfonyloxy aromatique est un groupe benzènesulfonyloxy ou un groupe tosyloxy.
- 15 7. Procédé selon l'une quelconque des revendications 1 à 6, dans lequel la réaction est effectuée en présence d'un agent de neutralisation d'acide.
8. Procédé pour la préparation d'un composé de formule I'':



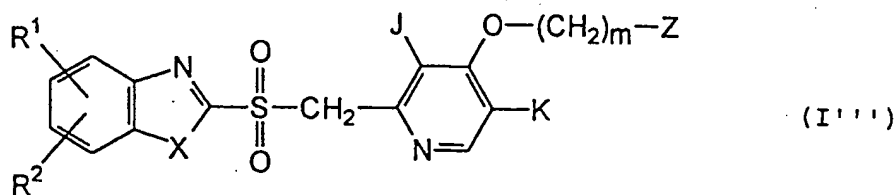
30 dans laquelle R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir le composé de formule I' tel que défini dans la revendication 1 avec une quantité approximativement équimolaire d'un agent oxydant, et éventuellement la transformation du produit en un sel.

9. Procédé selon la revendication 8, dans lequel l'agent oxydant est choisi parmi le peroxyde d'hydrogène, l'acide peracétique, l'acide m-chloroperbenzoïque, l'hypochlorite de sodium ou l'hypobromite de sodium.
- 35 10. Procédé pour la préparation d'un composé de formule I''' :



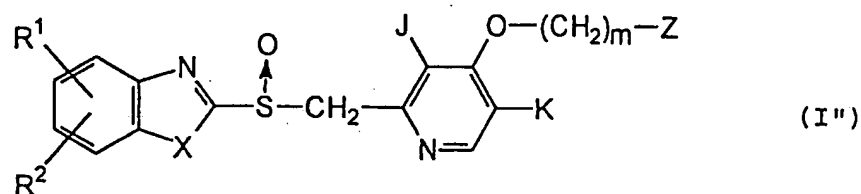
50 dans laquelle R<sup>1</sup>, R<sup>2</sup>, X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir le composé de formule I' tel que défini dans la revendication 1 avec au moins deux équivalents molaires d'un agent oxydant, et éventuellement la transformation du produit en un sel.

11. Procédé selon la revendication 10, dans lequel l'agent oxydant est choisi parmi le peroxyde d'hydrogène, l'acide peracétique, l'acide m-chloroperbenzoïque, l'hypochlorite de sodium ou le m-periodate de sodium.
- 55 12. Procédé pour la préparation du composé de formule I''' :



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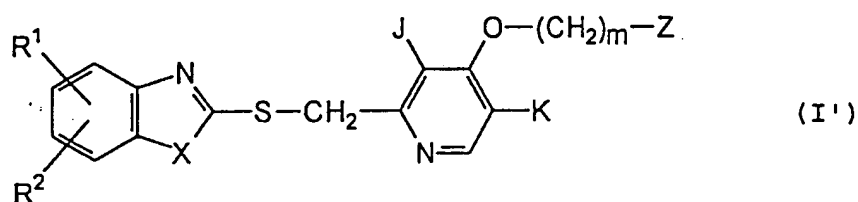
dans laquelle  $R^1$ ,  $R^2$ , X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir un agent oxydant avec un composé de formule I'':



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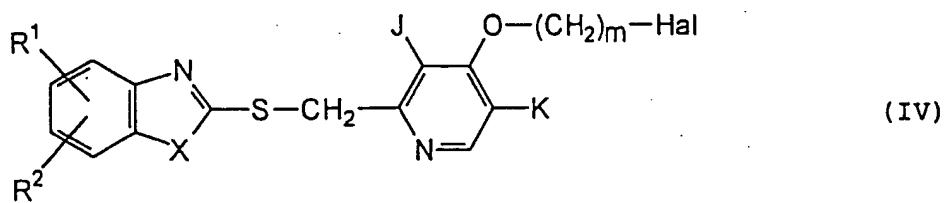
25 dans laquelle  $R^1$ ,  $R^2$ , X, J, K, Z et m sont tels que définis ci-dessus, et éventuellement la transformation du produit en un sel.

13. Procédé pour la préparation d'un composé de formule I' :



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40 dans laquelle  $R^1$ ,  $R^2$ , X, J, K, Z et m sont tels que définis dans la revendication 1, ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir un composé de formule IV:

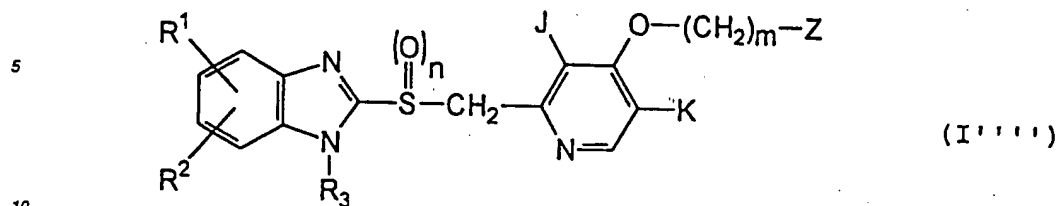


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55 dans laquelle  $R^1$ ,  $R^2$ , X, K, J et m sont tels que définis ci-dessus et Hal représente un atome d'halogène, avec un composé de formule Z-H, dans laquelle Z est tel que défini ci-dessus, et éventuellement la transformation du produit en un sel.

14. Procédé selon la revendication 13, dans lequel la réaction est effectuée en présence d'un agent de neutralisation d'acide.

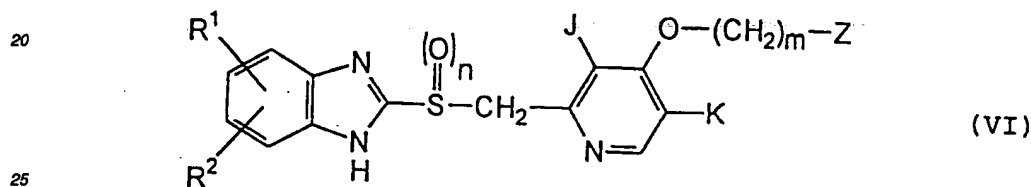
15. Procédé pour la préparation d'un composé de formule I''':



dans laquelle  $R^1$ ,  $R^2$ , J, K, m et Z sont tels que définis dans la revendication 1 et  $R^3$  représente un groupe alkyle en  $C_1$ - $C_6$ , phényle, benzyle ou alcoxy(en  $C_1$ - $C_6$ )carbonyle,

n représente un nombre entier de 0 à 2,

ou d'un sel pharmaceutiquement acceptable de celui-ci, comprenant l'étape consistant à faire réagir le composé de formule VI:



dans laquelle  $R^1$ ,  $R^2$ , n, J, K, m et Z sont tels que définis ci-dessus, avec  $R^3$ -Hal, où Hal représente un atome d'halogène, et éventuellement la transformation du produit en un sel.

16. Procédé selon la revendication 15, qui est effectué en présence d'un agent de déshydrohalogénéation.

17. Procédé de préparation d'une composition pharmaceutique pour le traitement ou la prévention des ulcères peptiques qui comprend la formulation de 0,1 à 100 g du dérivé de pyridine ou d'un sel pharmacologiquement acceptable de celui-ci par dose unitaire obtenu par un procédé selon l'une quelconque des revendications précédentes avec un support pharmacologiquement acceptable.